PB85-249639

Superfund Record of Decision (EPA Region 1) McKin Site, Gray, Maine (Second Remedial Action), July 1985

(U.S.) Environmental Protection Agency
Washington, DC

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EPA

Superfund Record of Decision:

McKin Site, ME
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15. SUPPLEMENTARY NOTES

16. ABSTRACT

The McKin Company site is located on the west side of Mayall Road between Route 115 and Pownall Road in Gray, Maine. The site is approximately seven acres with 4.5 acres cleared and partially excavated. Between 1965 and 1978, the McKin Company operated a waste collection, transfer, and disposal facility at the site. The Remedial Action Master Plan (RAMP) for the McKin site was prepared in April 1983. Initial Remedial Measures (IRMS) implemented at the site included cleaning and removal of all remaining above-ground tanks. This work was completed in September 1985 and represents the most recent removal action to take place on the site. Presently, the site consists of a fenced enclosure containing an incinerator, a concrete block building, an asphalt-lined lagoon, miscellaneous debris, and one buried fuel tank. An outer fence along Mayall Road and portions of the northern and southern site boundaries restrict vehicle and pedestrian acess to the site.

The selected remedial action includes: on-site soil aeration; off-site disposal of approximately 16 drums; soil tests; a groundwater extraction, treatment, and surface water discharge system; off-site groundwater and surface water monitoring program to evaluate the effectiveness of the on-site source control and off-site groundwater extraction and

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision McKin Site, ME Contaminated Media: soil, gw, sw Key contaminants: 1,1,1 Trichloroethane, DCE, TCE, oils, methylene chloride, volatile organics		

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16. ABSTRACT, Con't.

treatment system; and site removal and closure activities. Total capital cost for the selected remedial alternative is estimated to be $3,919,000 and O & M costs are approximately $38,900 per year.

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

Site: McKin, Gray, Maine

DOCUMENTS REVIEWED

I am basing my decision primarily on the following documents describing the analysis of cost-effectiveness of remedial alternatives for the McKin site:

1. Remedial Investigation for McKin Company Hazardous Waste Site, Gray, Maine, January 1985, prepared for the State of Maine, Department of Environmental Protection, Augusta, Maine, prepared by Camp Dresser and McKee, Inc., Boston, Massachusetts.

2. Feasibility Study for McKin Company Hazardous Waste Site, Gray, Maine, March 1985, prepared for State of Maine, Department of Environmental Protection, Augusta, Maine, prepared by Camp Dresser and McKee, Inc., Boston, Massachusetts.

3. Summary of Remedial Alternative Selection (attached).

4. Community Relations Responsiveness Summary (attached).

5. The National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300.

6. 40 C.F.R. Part 264 - Standards for Owners and Operators of Hazardous Waste Treatment Storage, and Disposal Facilities.

7. Hydrogeologic Study, East Gray, Maine for the Maine Department of Environmental Protection, November 29, 1982, prepared by Robert G. Gerber, Inc.

8. Health Surveillance Program Protocol for Persons Exposed to Hazardous Wastes from the McKin Dump site, Gray, Maine, prepared by State of Maine, Department of Human Services, Bureau of Health, Division of Disease Control, August, 1983.

9. Compilation of Information Generated since May 6, 1985, Regarding Record of Decision for McKin Site, July 1, 1985.

10. Memoranda, letters, and recommendations of staff and other Federal agencies.

DESCRIPTION OF SELECTED REMEDY

- On-site aeration of soils in site areas of identified hazardous substance contamination to achieve soil quality levels protective of public health, welfare, and the environment.

- Off-site disposal of approximately 16 drums found on the site and their contents.

- Performing soil tests in petroleum contaminated areas to characterize further the nature of contamination.

- Constructing a groundwater extraction, treatment, and surface water discharge system and operating this system as a remedial treatment unit for a period of five years with a target groundwater performance standard of 92 ppb 1,1,1-trichloroethane and 28 ppb trichloroethylene for groundwater quality.

- Re-evaluating the groundwater performance standard, if this standard is not achieved at the end of the five-year period or earlier if warranted by system performance or site conditions.

- Initiating an off-site groundwater and surface water monitoring program to evaluate the effectiveness of the on-site source control and off-site groundwater extraction and treatment system.

- Performing site removal and closure activities including disposal of on-site debris, disposal of discrete areas of significant non-volatile contamination not identified in the RI, disposal of metallic structures, demolition and disposal of the site's building, draining and filling in the lagoon, removal and disposal of known buried drums and their contents, removal and disposal of decontamination rinsate and other waste materials that result from remedial activities, removal and disposal of a buried fuel tank, fencing the site with appropriate signs, loaming the site, and vegetating the site.

DECLARATIONS

Consistent with the Comprehensive Environmental Response Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 C.F.R. Part 300), I have determined that at the McKin Company site, on-site soil aeration, extraction and treatment of groundwater from off-site contaminated areas and the other measures as described above are the cost-effective

remedies for the on-site soil and off-site groundwater contamination and provide adequate protection of public health, welfare, and the environment.

The State of Maine has been consulted and concurs with the selected remedy. In addition, the action will require operation and maintenance activities to ensure the continued effectiveness of the remedy. These activities will be considered part of the approval action and eligible for Trust Fund monies for a period of one year from the completion of remedial actions.

I have also determined that the action being taken is the cost-effective alternative when compared to other remedial options reviewed and is appropriate when balanced against the availability of Trust Fund monies for use at other sites. In addition, the off-site transport and secure disposition of a small quantity of contaminated drums and other material is more cost-effective than other remedial action for this small quantity of contaminated drums and other materials.

7/22/85
Date

Michael R. Deland
Regional Administrator

IV

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
McKin Company Site - Gray, Maine

SITE LOCATION AND DESCRIPTION

The McKin Company site is located on the west side of Mayall Road between Route 115 and Pownall Road in Gray, Maine, approximately fifteen miles north of Portland, Maine and the Atlantic Ocean (see figure 1). The site is approximately 7 acres with approximately 4.5 acres being cleared and partially excavated. Between 1965 and 1978, the McKin Company operated a waste collection, transfer, and disposal facility at the site.

Following removal actions, the site presently consists of a fenced enclosure containing an incinerator, a concrete block building, an asphalt-lined lagoon, miscellaneous debris, and one buried fuel tank. An outer fence along Mayall Road and portions of the northern and southern site boundaries restricts vehicle access and deters pedestrian access to the site.

The topography of the site area is relatively flat west of Mayall Road. The topography of the site has been modified by past excavations, with the on-site fenced enclosure surrounded by steep upward slopes to the west, south, and north. At-grade access is from Mayall Road, and beyond Mayall Road, the land slopes steeply eastward to the Royal River. Elevations range from approximately 300 feet mean sea level (MSL) at the site to less than 200 feet MSL at the river, approximately 3/4 miles due east. The site area is located on a relatively permeable glacial outwash plain comprised of stratified sand, gravel, and boulders overlying heavily weathered granitic bedrock (see figure 2). Cores of the underlying bedrock were moderately to heavily fractured and demonstrate a moderately high bulk permeability as determined by computer simulations. No surface run-off from the site has been observed, and it is inferred that site surface drainage is contained on-site and incident water either evapotranspirates or percolates into the soil. The eventual surface discharge location of this percolating water is the Royal River system. The Royal River is a State Class C waterway, acceptable for recreational boating and fishing, but not for water contact recreation or as a drinking water source without treatment. The site is not located in a wetland or floodplain based on a site evaluation by the U.S. Army Corps of Engineers.

Neighboring lands include residential areas, wooded areas, and rural farmland. The nearest residences are immediately north and west of the site, located within 1500 feet of the site and within a triangle formed by Pownal Road, Mayall Road, and

Route 115. The closest home is within approximately 200 feet of the site. The bedrock aquifer beneath homes to the north of the site served as a private water supply until private wells were contaminated with chlorinated organic compounds.

SITE HISTORY

In 1963 Richard A. Dingwell, the owner of the McKin Company, purchased the McKin site and shortly thereafter began to use the site to store and dispose of liquid wastes. Prior to use by the McKin Company, the land was reportly used intermittently as a sand and gravel pit. From 1965 to 1978 the McKin Company operated a tank cleaning and waste removal business using the Gray site for collection, storage, disposal and transfer of petroleum wastes and industrial chemical wastes. Waste handling facilities at the site used during McKin Company operations included 22 above-ground storage tanks, an asphalt-lined lagoon, and an incinerator (see figure 3). Liquid wastes were trucked to the site by the McKin Company and others. On-site waste handling procedures included discharge to the ground, storage in tanks or the lagoon, transport off-site by truck, incineration, and on-site burial. Approximately 100,000 to 200,000 gallons of waste were received annually by the McKin facility between 1972 and 1977.

In 1972 the McKin Company business expanded and the on-site asphalt lagoon and the incinerator began operating to accommodate wastes generated by an ocean oil spill when a tanker owned by Texaco ran aground off the Maine coast. The McKin Company held a permit from the Maine Department of Environmental Protection to operate the incinerator in the 1970's. Use of the incinerator ceased in or around 1973. Site operations ended in 1977 or 1978.

As early as 1973, nearby residents in East Gray reported odors in well water and discoloration of laundry. Sampling indicated the presence of organic contaminants in residential wells, and the Town of Gray issued an Emergency Health Ordinance placing a moratorium on any new construction within about two miles of the site. In November 1977 Fred C. Hart Associates, a contractor to EPA, conducted a hydrogeologic assessment of the area, which indicated contaminants from the McKin site had reached many local private wells. In December 1977, the Town of Gray issued a Cleanup Order to the McKin Company. Also in December 1977, sixteen private water supply wells were capped, and emergency water supplies were brought in by truck to service nearby residents. In August 1978 affected homes were connected to a public water supply in an action funded by a $300,000 "Imminent Threat Grant" from the U.S. Department of Housing and Urban Development (HUD) and matching funds from the Town of Gray. The Maine Attorney General's office filed a suit against the McKin Company in 1978. This suit has not

been resolved. A separate class action initiated by a Gray citizens group was settled out of court. During the summer of 1979, Maine DEP supervised the removal of pumpable liquid wastes from the above-ground tanks and drums. This amounted to approximately 33,500 gallons of oil and chemical waste. Additional DEP actions taken in 1979 and 1980 included moving empty 55 gallon drums into the fenced area, performing a magnetometer survey, installing and sampling monitoring wells around the site and collecting and analyzing soil and groundwater samples. In a November 1982 hydrogeologic study prepared by Robert G. Gerber and funded by DEP, Gerber simulated groundwater movement in the site area and concluded that local groundwater contamination in the surficial and bedrock aquifer resulted from waste disposal practices at the McKin site. Air quality at the site was monitored by EPA in November 1982, and residual materials in the above-ground tanks were sampled and analyzed by DEP in March 1983. In April 1983, DEP contracted Jetline Services to rinse and crush a number of on-site barrels and containers and provide cost estimates to clean and dispose of all remaining above-ground tanks.

A Remedial Action Master Plan (RAMP) for the McKin site was prepared in April 1983 by Camp, Dresser and McKee (CDM) under contract to EPA. The RAMP recommended collecting the necessary data, developing the required site area remedial action program and implementing certain Initial Remedial Measures (IRM's) to remedy potential hazards. DEP entered into a Cooperative Agreement with EPA in June 1983 to implement the IRM's and the Remedial Investigation and Feasibility Study (RI/FS) as recommended in the RAMP. The IRM work conducted by Jetline Services included the cleaning and removal of all remaining above-ground tanks from the site. This work was completed in September 1983 and represents the most recent removal action to take place on the site. In January 1984, CDM was awarded a contract by DEP to undertake the RI/FS for the McKin site. The RI was completed in February 1985 and the FS in March 1985.

CURRENT SITE STATUS

As identified in the RI, there are two remaining major contamination problems associated with the site. The first is on-site soil contamination in specific areas, which serves as a source for off-site groundwater contamination. The second is groundwater contamination of the surficial and bedrock aquifers downgradient of the site. These two problems are considered in a series of source control alternatives and a second series of off-site control alternatives in the FS.

On-site Soil Contamination

The nature and extent of the on-site contamination problem was identified during the RI based on surface and sub-surface

on-site soil sampling conducted by means of drilling (see locations in figure 4), test pits (see locations in figure 5), hand auger borings (see locations in figure 6), and monitoring contamination in horizontal grids around contaminated locations. Sample locations shown in figures 4, 5 and 6 were selected in part based on detected magnetic anomalies, historical disposal data and visual evidence of contamination. The laboratory analytical results of on-site soil samples are summarized in Table 1. The samples listed in Table 1 were analyzed during the RI and found to contain all or some of the 17 hazardous substances listed in Table 1. In soil tests conducted in 1980, other priority pollutants were detected in on-site soils in concentrations ranging from zero to several parts per million (ppm). These pollutants include polyaromatic compounds, phenols, and phthalates. Based on Maine DEP records the locations of these 1980 soils tests were near soil borings SS08 and SS01 shown in Figure 6 taken during the RI.

Each of these 17 hazardous soil contaminants detected in the RI can be classified as either a volatile organic compound or a heavy metal. Generally, the volatile organic compounds such as trichloroethylene and 1,1,1-trichloroethane are soluble and susceptable to leaching and migration to the groundwater. The detected concentrations of heavy metals are relatively small (15 ppm soil or less) and within ranges typically found in soils. Compared with the volatile organics, the heavy metal contaminants are generally less susceptable to leaching and migration to groundwater. Of the contaminants detected in on-site soils only trichloroethylene and 1,1,1-trichloroethane were detected in groundwater during the RI.

Six areas of surface soil contamination were identified and staked out in the field based on surface and subsurface tests. These areas are identified on a site map in Figure 7, as Areas 1 through 6. Area 1 is further divided in Areas 1A, 1B and 1C based on physical and chemical properties. Volume estimates of the contaminated soil in each area are provided in Table 2.

Areas 1A, 1C and 2 appear to be old oil disposal locations, where oil soaked debris and other suspected contaminants were disposed of and covered with various thicknesses of fill. In areas 1A, 1C, and 2, the major contaminants appear to be typical derivatives of petroleum refining, constituents of petroleum, or incidental petroleum contaminants based on laboratory analyses and physical observations. It is possible that remedial actions in areas 1A, 1C, and 2 are not covered by CERCLA given the discrete nature of this petroleum contamination on this site and the lack of groundwater contamination by typical constituents of petroleum. Further soil tests are

required to make this determination and will be performed during the remedial design. Prior to this determination areas 1A, 1C, and 2 are not specifically included in the on-site CERCLA remedy described herein.

Areas 3, 4, and 5 are the most contaminated areas found remaining on the site. Aerial photographs reveal that areas 3, 4, and 5 exhibit obvious signs of discoloration and contamination. Among the most contaminated soils found on-site are those in test pit TP6A, in Area 3 (1400 mg/kg trichloroethylene, 49 mg/kg methylene chloride, 4.5 mg/kg 1,1 1-trichloroethane, and other contaminants), and soils found in soil boring SS02 in Area 4 (1500 mg/kg trichlorethylene, 21 mg/kg xylenes, 9.2 mg/kg dichlorobenzene, and other contaminants).

The depth of contamination in Areas 1, 2, 4, 5 and 6 was identified at six feet or less in the RI field studies. The depth of contamination in Area 3 is at least 12 feet, and a 40 foot depth, the measured depth to groundwater in the area, has been used to estimate conservatively the volume of contaminated soil in Area 3. In addition to soil contamination in Areas 1B, 3, 4, 5 and 6, sixteen drums were located on the site as presented in Table 3. The FS addresses source control remedial action for Area 1B, 3, 4, 5 and 6, the 16 known buried drums, and the remaining building and structures on the site.

Off-site Groundwater Contamination

The off-site groundwater contamination problem caused by the McKin site was investigated in the RI by groundwater monitoring and modeling. Groundwater at various depths was sampled in locations shown in Figure 8. Of the compounds analyzed for in the RI (see Table 4) the only compounds detected in the off-site groundwater were 1,1,1-trichloroethane and trichloroethylene as presented in Table 5.

Previous tests identified 1,1,1-trichloroethane and trichloroethylene as the major groundwater contaminants with several other contaminants also identified in the off-site groundwater. Some of the previously detected compounds such as 1,2-dichloroethane, 1,1-dichloroethane, chloroform, and tetrachloroetheylene were tested for specifically and not detected during the RI. Others, such as dimethyl sulfide and Freon, are not considered priority pollutants.

In the surficial aquifer, the location of the highest level of contamination is B-1, which is approximately 600 feet north, northwest of the site adjacent to Pownal Road (16,000 ppb trichloroethylene and 170 ppb 1,1,1-trichloroethane).

The location with the next highest level of contamination in the surficial aquifer is B-3, approximately 1200 feet north northeast of the site (1,800 trichloroethylene and 65 ppb 1,1,1-trichloroethane). These levels and a computer simulation of groundwater flow reveal a groundwater contamination plume. In the surficial aquifer the contamination plume is located from the site for roughly 1,000 feet, then swings to the east towards the Royal River. The inferred surficial aquifer plume as modeled with observed 1984 1,1,1-trichlorethane concentrations is presented in Figure 9. A north-south bedrock ridge directly east of the site appears to account for the swing in the surficial aquifer direction in the site vicinity. Location B-3 represents the furthest lateral extension of surficial aquifer contamination detected in the RI field studies. The well at B-4 which is screened at the soil-bedrock interface approximately half-way between the site and the Royal River did not show detectable contamination. This may indicate that the contamination is contained entirely within the bedrock at that point.

In the bedrock aquifer, which prior to 1977 served as the drinking water supply of nearby residences, the groundwater appears to be conducted in fractures and cracks. The location of the highest level of contamination is B-1 approximately 600 feet north, northwest of the site and adjacent to Pownal Road (29,000 ppb trichloroethylene and 500 ppb 1,1,1-trichloroethane). Downgradient concentrations of trichloroetheylene in the bedrock groundwater at B-2, B-3, and B-5 are 56 ppb, 120 ppb and 190 ppb, respectively. Figure 10 depicts the bedrock aquifer plume, as modeled with the 1984 1,1,1-trichloroethane concentrations. The information suggests that the centerline of the bedrock contamination plume falls more or less under the surficial aquifer contaminant plume, however the bedrock contamination plume is more dispersed than the surficial aquifer contamination plume. This is attributed to the fractured nature of the bedrock.

The eventual discharge location of both the surficial and bedrock aquifers is the Royal River system. This system includes a number of springs, including Boiling Springs, located on the easterly sloping land between the site and the Royal River. Previous sampling programs found trace amounts of volatile organic contaminants in Collyer Brook, a tributary to the Royal River. During the 1984 RI field study, surface water quality monitoring was performed in both of these surface waters as well as Boiling Springs and the on-site lagoon (see Figure 11). The laboratory results presented in Table 6 indicate the levels of trichloroethylene and 1,1,1-trichloroethane in Collyer Brook and the Royal River are below a 1 ppb detection level. Concentrations of trichloroethylene (44 and 32 ppb) and 1,1,1-trichloroethane (30 and 10 ppb) were detected in Boiling Springs. The

absence of any volatile organic contaminants in the Royal River or Collyer Brook indicate that these water courses are not being adversely impacted by the McKin site. The most probable explanation for these absences is the volatilization of these contaminants from the surface water.

Risk Assessment

Current potential health and environmental risks involved with no action alternatives are associated primarily with contaminated groundwater. For exposures to other environmental media, the risks are insignificant based on comparisons with relevant guidelines and the risk assessment performed in the FS. The risk assessment performed in the FS, as summarized below, is based on hydrogeology, climate, toxicity data, and other factors.

The concentrations of contamination in the Royal River present neither a significant health risk through direct ingestion of river water or dermal absorption during swimming nor a significant environmental risk to aquatic species in the river based on a comparison with applicable or relevant EPA criteria. On-site air monitoring detected concentrations of contaminants below available state guidelines for ambient air levels. Ingestion of ten grams of the most contaminated on-site soil would result in an exposure to trichloroethylene below known acutely toxic effects and the risk from chronic ingestion of contaminated soil is not significant based on limited exposures to the site and the degree of soil contamination. Acute or chronic public health affects from dermal contact with on-site contaminated soil are not expected based on soil concentrations, the volatile nature of the contaminants, and toxicological literature.

The release of contamination to the off-site aquifer is an impact to an environmental resource. It has caused the closure of private wells. Since this aquifer also represents a potential drinking water source, the existing contamination may restrict future use of this resource. The public health risk associated with the groundwater contamination is considered potential because there are no known users of the groundwater for a drinking water supply since extension of a municipal water line in 1977. No EPA primary drinking water standards exist for the two detected groundwater contaminants. For 1,1,1-trichloroethane, not classified as a suspected human carcinogen, the most relevant guideline for risk assessment is a proposed recommended maximum contaminant level (RMCL) of 200 ppb. This level is exceeded in one of the groundwater monitoring wells (B-1,bedrock). Trichloroethylene is a suspected human carcinogen, and the concentrations associated with a 10^{-5} lifetime risk of cancer for a 2 liter per day

water intake by a 70 kg adult is 28 ppb based on Cancer Assessment Group (CAG) data. This guideline level is exceeded at most of the groundwater sampling locations. Therefore, there is a public health risk associated with the long term consumption of groundwater at its present contamination levels. Furthermore, groundwater is considered an integral portion of the environment, and therefore, the presence of groundwater contamination at levels found in the RI represents a risk to the environment.

ENFORCEMENT ANALYSIS

Potentially responsible parties (PRP's) for the McKin site include the former owner and operators, generators, and transporters. To date, approximately ten notice letters have been sent to generators or transporters based primarily on McKin Company records, which suggest these parties contributed hazardous substances to the site. EPA is continuing to identify additional responsible parties and may send out further notice letters as new evidence is developed. There are also over two hundred additional parties which apparently sent petroleum wastes to the site.

Richard Dingwell is the former owner and operator of the McKin Company at the Gray site. Dingwell was sued by the Maine Attorney General's Office in 1978 and this case has not been resolved. In addition, a separate class action suit was filed by a Gray citizens group and was settled out of court.

Several of the potentially responsible parties have expressed written interest in participating in the remedial design and construction process. EPA is continuing negotiations with these parties. Representatives of these companies have also participated in the public hearing and public comment period. Given the interest in responsible party cleanup by potentially responsible parties there is a chance of concluding successful negotiations for construction.

EPA's overriding concern is ensuring that the selected remedy complies with the National Contingency Plan. In this regard, there is no flexibility for negotiations. Technical differences in design and construction approaches used to achieve this remedy may be the subject of negotiations. Technical differences between the selected remedy and the remedies proposed by the potentially responsible parties are contained elsewhere in this document and in the attached Responsiveness Summary.

COMMUNITY RELATIONS

Community interest in the McKin site has been strong since the detection of contamination in the 1970's. A public meeting to describe the RI/FS and to respond to citizen's questions was

held at Stinson Hall in Gray, Maine on April 17, 1985. Approximately 40 persons attended including citizens, elected officials, and technical and legal representatives of potentially responsible parties. On April 24, 1985, a public hearing was held at the same location to record comments by the public including potentially responsible parties. Comments were given by Maine DEP, the Town Council, the Gray Conservation Commission, private citizens, the Maine's People's Alliance, two state congressmen, and three representatives of potentially responsbile parties. Written comments from some of the same parties and additional parties were received during the remainder of the public comment period. These comments and EPA's responses are included in the attached responsiveness summary. In addition, the comments are summarized below. Following two time extensions, the public comment period on the RI/FS was extended twice to ensure that all interested parties had an opportunity to comment and was open from March 27 to May 6, 1985. On July 2, 1985, EPA representatives participated in a Gray Town Council Meeting to inform the Council and the public of EPA's proposed remedial action and to answer questions from the Council and the public.

Regarding source control alternatives, oral and written statements against capping have been made by Cathy Hinds of the Maine's People Alliance (speaking for a number of citizens at the public hearing), other citizens, State Representative Donnell P. Carroll and State Representative James Mitchell. The Maine's People Alliance favored on-site incineration. The Town Council considered the proposed alternatives and was split with three councilors endorsing a cap and two councilors preferring incineration. The Town Council stated a preference for a clay cap rather than a synthetic cap. A letter representing four residents near the Gray site indicated a changed preference from incineration to capping. Capping was endorsed as the least objectionable source control method in a separate letter from a member of the Gray Planning Board and the McKin Site Evaluation Committee. The State DEP and potentially responsible party representatives presented comments in favor of on-site aeration as a source reduction method. Public health concerns regarding airborne emissions are the most often cited objection to both aeration and incineration while public objection to capping centers on the argument that a cap covers but does not eliminate the waste and eventually contaminants will emerge.

A number of comments also were received regarding off-site control alternatives. Many comments centered on the inequity of possibly having the state tax-payers saddled with the burden for payment of operation and maintenance costs. Comments received from citizens and from the Town Council endorsed extraction and treatment of groundwater from the contaminated

aquifer. The Maine's People Alliance and citizens were in favor of Alternative 7C, specifically. Considerable opposition to an off-site groundwater extraction system and questions regarding the system were raised by potentially responsible parties and by Maine DEP. Concerns primarily centered on the cost effectiveness of an off-site groundwater recovery system, the system's feasibility, and the need to accelerate actively the restoration of the aquifer which is not presently being used as a drinking water supply.

CONSISTENCY WITH OTHER FEDERAL ENVIRONMENTAL LAWS

One measure used by EPA in determining whether a remedial alternative at Superfund sites adequately protects public health, welfare, and the environment is whether the alternative attains the substantive provisions of other federal public health and environmental standards. The primary Federal Standards which are relevant to the McKin site are the provisions and regulations of the Resource Conservation and Recovery Act (RCRA) describing site closure and groundwater monitoring requirements for RCRA treatment, storage, and disposal facilities. In addition, the requirements of the National Pollutant Discharge Elimination System (NPDES) program are applicable to the discharge of waste streams to surface waters.

The following source control alternatives have been proposed to meet RCRA requirements for hazardous waste facilities and hazardous waste handling when applied to the site, either individually or combination:

On-site Aeration: The RCRA closure regulations require either closure by removal of waste and waste residues which is equivalent to closure as a surface impoundment or closure as a landfill by capping and appropriate post closure care. The proposed aeration process, will meet the intent and technical requirements of the general RCRA closure standards (40 C.F.R. Part 264 Subpart G) and the specific closure standards of 40 C.F.R. Part 264 Subpart K (Surface Impoundments). The surface impoundment standards, and specifically 40 C.F.R. §264.228 the applicable closure standard, require the removal or decontamination of all waste residues and contaminated subsoils. As discussed herein, the residual soil contamination level after the aeration process that will be protective of human health and the environment is 0.1 ppm trichloroethylene. This level was determined by site specific solute fate and transport modeling that considered the potential impact of this level on groundwater. This level was reviewed by the Centers of Disease Control and found to pose no

hazard for direct soil ingestion, particulate ingestion or dermal contact. A groundwater monitoring program will be implemented to monitor water quality and verify the assumptions made in the fate and transport modeling.

Excavation of Contaminated Soil, Debris, and Buried Drums with Off-site Deposition: This alternative meets the relevant requirements of RCRA. Disposal of wastes will be in accordance with the appropriate RCRA regulations for the transportation and disposal of hazardous waste. Off-site facilities used for disposal or incineration will be RCRA approved facilities which have a permit or interim status and are in compliance with the RCRA regulations. Proper manifesting of wastes will be conducted. Off-site disposal will not require on-site treatment, storage beyond staging time or disposal of hazardous wastes, and therefore, there are no issues involving the consistency of on-site actions with RCRA other than the need to characterize each load of material.

Regarding off-site controls, the relevant federal laws are RCRA hazardous waste facility regulations regarding groundwater protection (40 C.F.R. Subpart F) and the 1984 RCRA Amendments. The RCRA groundwater regulations require the setting of groundwater protection standards, which are levels that are protective of human health and the environment. Corrective action is required if these levels are exceeded. The groundwater protection standard of RCRA requires the contamination levels (MCL's) or alternate concentration limits (ACL's). ACL's are site specific levels that are demonstrated to be protective of human health and the environment. The 1984 RCRA Amendments require off-site groundwater corrective action to attain the groundwater protection standards. Generally, RCRA regulations and RCRA Amendments provide for ensuring that groundwater contamination levels do not cause a hazard to human health or the environment. The selected off-site control alternative, provides for groundwater extraction to the extent practical followed by treatment and surface water discharge. This alternative is consistent with the intent of RCRA by restoring the aquifer. A groundwater monitoring program to demonstrate the effectiveness of the extraction program will be performed as required in the RCRA regulations. In extracting groundwater from the surficial aquifer and in the uppermost portion of bedrock, the system reduces flow of contaminated groundwater to the bedrock aquifer, actively treats the surficial aquifer, and treats a substantial portion of the bedrock aquifer.

In this decision, performance standards to be achieved in the five-year remedial treatment unit of groundwater extraction and treatment are established as target groundwater concentrations in the off-site aquifer. These performance standards are 28 parts

per billion (ppb) trichloroethylene and 92 ppb 1,1,1-trichloroethane. The analysis in the FS and this document used in setting these performance standards is based on environmental and health criteria. This analysis is technically equivalent to a RCRA ACL determination.

The selected groundwater extraction and treatment option includes a surface discharge of treated groundwater. Design specifications for the treatment plant, effluent concentrations and discharge structures will be consistent with the provisions of the relevant federal program.

ALTERNATIVE EVALUATION

Remedial Action Objectives

As identified in the National Contingency Plan, the objective of the evaluation of alternatives is to select the "lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare or the environment." 40 C.F.R. §300.68(j).

With certain exceptions that are consistent with EPA policy, the adequacy of protection of public health, welfare, and the environment posed by each alternative will be determined based on the alternative's attainment of the substantive provisions of other Federal public health and environmental standards. The following list identifies EPA's specific public health and environmental objectives for remedial action selection at McKin, as well as applicable or relevant standards which are used, in part, to judge attainment of these objectives:

- To maintain adequate safe drinking water for the population that could be affected by groundwater contamination. Applicable federal drinking water standards are used, when possible, to determine the attainment of this public health objective.

- To prevent exposure of the public to inhalation of harmful amounts of airborne contamination. Relevant ambient air levels recommended by the Centers for Disease Control are used, when possible, to determine the attainment of this public health objective.

- To prevent the subsurface discharge of contaminated groundwater from the site to off-site aquifers. Relevant federal standards for hazardous waste facilities (40 C.F.R. 264 and recent RCRA Amendments) will be used to determine the attainment of this environmental objective.

- To restore, within a reasonable time and practical limits, the off-site aquifer that has been contaminated by groundwater migrating from the site to levels protective of public health as a drinking water supply and the environment. Relevant federal standards will be used to determine the attainment of this public health and environmental objective.

- To protect state-designated Royal River surface water uses and aquatic life in the Royal River. Applicable state water quality criteria will be used to determine the attainment of these environmental objectives.

- To prevent hazardous dermal contact with or hazardous ingestion of contaminated soil by the public.

ALTERNATIVES CONSIDERED

The following remedial action alternatives were considered:

Source Control

- No action
- No action with monitoring
- Capping the site.
- Installing a containment wall and capping.
- Excavation and off-site disposal.
- Excavation with on-site incineration and disposal.
- Excavation with on-site treatment and disposal.
- Excavation with off-site treatment and disposal.

Off-site Control

- No action.
- No action with monitoring.
- Pumping, treating, and reinjection of groundwater to aquifer or discharge to Royal River.
- Restriction on future development.

Site Closure Activities Common to all Alternatives

- Disposal of all above-ground on-site debris (i.e. hoses, rags, etc.).
- Removal and disposal of on-site metallic structures (i.e. incinerator, conveyor system, tubing, etc.).
- Demolition and disposal of the masonry block building.
- Draining and filling in the existing asphalt lagoon.
- Removal and disposal of all known buried steel and fiber drums and their contents.
- Removal and disposal of decontamination rinsate and other waste materials that result from remedial actions.
- Removal and disposal of the buried 3,000 gallon tank located south of masonry building.
- Fencing entire cleared site with placement of appropriate warning signs.
- Loaming and vegetating the site.

As described in FS, a review and initial screening process eliminated the following alternatives or portions of alternatives as not mitigating identified public health or environmental threats, being technically infeasible or providing no substantially greater public health or environmental benefits over alternatives incurring less cost:

1. No action (does not mitigate public health or environmental threats).
2. Capping entire cleared area of the site (no substantially greater benefits).
3. Installing a containment wall around the contaminated areas (no substantially greater benefits).
4. On-site soil encapsulation (no substantially greater benefits).
5. Systematically recovering contaminated groundwater from fractured bedrock to clean the bedrock aquifer in a comprehensive manner (technically infeasible).

The screening of remedial alternatives indicates that a source control remedial action will be necessary to mitigate the threat to public health and the environment. A source control

action to lessen the generation of groundwater contamination and further prevent direct contact with the site is required. For this reason the "No Action" alternative does not warrant further consideration as a source control remedial action alternative.

The remaining alternatives were then evaluated based on environmental and technical concerns, reliability, implementability, operations and maintenance (O&M) requirements, health and safety considerations and detailed cost estimations, including distribution of costs over time in accordance with 40 C.F.R. §300.68(i). The alternatives evaluated during this detailed review and screening included both on-site source controls or off-site controls:

On-Site Source Control

- Alt. 1 - No Action with monitoring.
- Alt. 2 - Capping of contaminated soil areas.
- Alt. 3A - Excavation of contaminated soil with off-site landfill disposal.
- Alt. 3B - Excavation of contaminated soil with off-site incineration.
- Alt. 4 - On-site incineration of contaminated soil with on-site landfilling.
- Alt. 5A - On-site aeration and landfilling of contaminated soil.
- Alt. 5B - Off-site aeration and landfilling of contaminated soil.
- Alt. 5C - On-site aeration and capping of certain contaminated soil.

Off-Site Control

- Alt. 6 - No Action with monitoring.
- Alt. 7 - Groundwater extraction and treatment and on-site recharge.
  - 7A - Groundwater extraction wells at one location.
  - 7B - Groundwater extraction wells at two locations.
  - 7C - Groundwater extraction wells at three locations.
- Alt. 8 - Restrictions on Future Development.

A brief description of these alternatives is given below, and Table 7 summarizes the costs, (capital, O/M, present worth), technical considerations, environmental considerations, public health considerations, and public comments for each alternative.

1. No Action with Monitoring. Monitoring wells would be installed around the site and periodically sampled; these samples would be analyzed for hazardous substances in order to monitor contamination of the groundwater.

2. Capping. An impermeable cap would be placed over contaminated areas of a site. Contaminated areas 1B, 3, 4, and 5 (see Figure 2) would be capped under a single cap and consistent with RCRA requirements, the contaminated soil in area 6 either would be removed for disposal off-site or would be placed under the on-site cap.

3. Excavation and Off-Site Disposal. Contaminated soil from the site would be removed and transported off-site for disposal. Two disposal alternatives were considered: (1) landfilling, which would involve disposal of hazardous material in a licensed hazardous waste landfill, or (2) incineration, which would destroy the contaminants by burning the contaminated soil at very high temperatures.

4. On-Site Incineration. Contaminated soil would be excavated and incinerated in a mobile incinerator set up with appropriate auxillary facilities on-site, and the ash residue remaining after incineration would be disposed of on-site.

5. Aeration. Contaminated soil would be rototilled or otherwise broken up and exposed to the air, allowing the contaminants to volatilize. Three versions of this alternative were considered:

   A. Aerate soil on-site

   B. Transport contaminated soil off-site for aeration; and

   C. Transport contaminated soil off-site for aeration, except Area 3, which would be capped.

6. No Action with Off-Site Monitoring. Off-site monitoring wells would be sampled periodically; these samples would be analyzed for hazardous substances to monitor contamination of the groundwater.

7. Groundwater Extraction and Treatment. Contaminated groundwater would be pumped from the ground by extraction wells

then treated to remove the contaminants. Three versions of this alternative were considered in the FS:

A. One series of extraction wells,

B. Two series of extraction wells, or

C. Three series of extraction wells.

This alternative would remove contamination already in the groundwater. To do this, contaminated groundwater would be intercepted as it leaves the site and further extracted from the off-site contaminated areas then pumped out by a series of extraction wells. Extraction well locations proposed in the FS are shown in Figure 12. The extracted water would be treated to remove the contaminants. It is estimated that groundwater extraction and treatment would reduce contamination of the groundwater to a level of 50 ppb of volatile organic contaminants in about five-years. Based on the groundwater characterization in the RI, air stripping and carbon filtration would be used to remove contaminants from the extracted groundwater. The air stripping process causes the contaminants to evaporate from the water into the air, and the air would then be sent through containers of activated carbon to remove contaminants from the air. In the three extraction and treatment options considered in the FS, treated water would be the discharged back to the groundwater on site.

An additional groundwater extraction and treatment alternative was proposed after the completion of the draft FS. This alternative does not specify the exact number or locations of groundwater extraction wells but proposes to extract groundwater and restore the offsite aquifer to the extent practical in a timely manner. To meet this objective, new wells developed for extraction most likely would be screened in the surficial aquifer and in the uppermost portion of the bedrock. The necessary treatment operations anticipated to remove contaminants from the extracted groundwater are the same as presented in the FS, however these operations and the treatment design will be assessed during a remedial design treatability study. This treatability study will evaluate groundwater quality for all priority pollutants in the contaminated aquifer and treatment efficiencies. Unlike the alternatives described in the FS, this alternative proposes to discharge treated groundwater to local surface water rather than to the groundwater. The costs, advantages and disadvantages of this groundwater extraction and treatment alternative are presented

in Table 7. The cost estimate for this alternative is based on cost data in the FS modified by the development of 25 extraction wells with an estimated withdrawal rate of 5 gallons per minute and a surface discharge to the Royal River.

8. Restrictions on Future Development. Future development in areas affected by the groundwater plume would be restricted, which would preclude the need to provide public water to new developments and would prevent the development of any contaminated water supply wells in presently undeveloped areas.

RECOMMENDED ALTERNATIVE

Section 300.68(j) of the National Contingency Plan (NCP) states that the appropriate extent of remedy shall be determined by the lead Agency's selection of the remedial alternative, which the Agency determines is cost-effective (i.e. the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare or the environment). Based upon our evaluation of the RI, the FS, the comments received on these reports, and the options specified in these reports and comments, EPA has determined and the state has agreed that the following remedy meets the NCP criteria:

- On-site aeration of soils in site areas of identified hazardous substance contamination to achieve soil quality levels protective of public health and the environment.

- Off-site disposal of approximately 16 drums found on the site and their contents.

- Performing soil tests in petroleum contaminated areas to further characterize the nature of contamination.

- Constructing a groundwater extraction, treatment, and surface water discharge system and operating this system as a remedial treatment unit for a period of five-years with a target groundwater performance standard of 92 ppb 1,1,1-trichloroethane and 28 ppb trichloroethylene for groundwater quality.

- Re-evaluating the groundwater performance standard, if this standard is not achieved at the end of the five-year period or earlier if warranted by system performance or site conditions.

- Initiating an off-site groundwater and surface water monitoring program to evaluate the effectiveness of the on-site source control and off-site groundwater extraction and treatment system.

- Performing site removal and closure activities including disposal of on-site debris, disposal of discrete areas of significant non-volatile contamination not identified in the RI, disposal of metallic structures, demolition and disposal of the site's building, draining and filling in the lagoon, removal and disposal of known buried drums and their contents, removal and disposal of decontamination rinsate and other waste materials that result from remedial activities, removal and disposal of a buried fuel tank, fencing the site with appropriate signs, loaming the site, and vegetating the site.

The following discussion describes the recommended alternative and the reason for its selection.

Source Control Remedy

Regarding the source control alternative, Alternative 1, No Action with Monitoring, was not selected because it is not responsive to the groundwater contamination issue and does not fulfill the site objectives. The implementation of Alternative 1 would result neither in the timely restoration of the off-site contaminated aquifer to the extent practical nor in the institutional controls to ensure no possible exposure to the contaminanted aquifer.

Each of the remaining source control alternatives is proposed to control further migration of pollutants from the contaminated unsaturated zone to the groundwater. Contamination below the high water table is addressed with off-site controls rather than source controls.

Alternative 5B, off-site aeration was not considered because it was found to be infeasible. During the FS no local off-site areas could be identified which would receive the contaminated soils for aeration and final deposition.

The remaining source control alternatives, Alternatives 2,3,4, and 5A, were all judged to be technologically feasible and reliable and to mitigate and minimize damage effectively and to provide adequate protection of public health, welfare, or the environment. Given the effectiveness of each of these alternatives, consideration of cost is appropriate in selecting a source control option. The estimated total present worth of capping the contaminated areas using a clay cap is $430,000 ($192,000 capital, $38,900 annual operation and maintenance) and is essentially the same as the estimated total present worth of on-site aeration, which is $440,000 ($424,000 capital and $1,600 annual operation and maintenance). The estimated present worth of the remaining alternatives are significantly higher: $1,863,000 for excavation and off-site landfilling,

($1,847,000 capital, $1,600 annual operation and maintenance); $5,103,000 for off-site incineration ($5,087,000 capital and $1,600 annual operation and maintenance); and $6,855,000 for on-site incineration ($6,840,000 capital, $1,600 annual operation and maintenance). Therefore, the cost-effectiveness of two alternatives, capping and on-site aeration, are judged to be essentially equivalent and the remaining source control alternatives are judged to be not cost-effective. Given the essentially equivalent cost-effectiveness of capping and on-site aeration, EPA has selected on-site aeration as the source control based on the Agency's policy to pursue response actions that use treatment over land disposal to the greatest extent practicable, consistent with CERCLA requirements for cost-effective remedial actions. In selecting this remedy EPA also selects target performance standards to be used in assessing the remedy's effectivenss. One performance standard is an average soil concentration of 0.1 ppm trichlorethylene averaged over a treatment volume. For heavy metal soil contaminants, the levels established in the Extraction Procedure (EP) toxicity tests (40 C.F.R. Part 261.24) or the results of solute fate and transport modeling using these test results represent performance standards. These performance standards are based on a health-based assessment specific for the McKin site and are applicable to soils removed from or remaining in the contamination Areas 1B, 3, 4, 5, and 6 identified in the RI. An on-site pilot study will be initiated to determine the extent to which soil aeration can be utilized to remove contaminants from the site, and the specific engineering methodologies to be used to aerate soils in a manner protective of public health.

While EPA regards Alternatives 2, 3, 4, and 5A as effective, there is variation in the approach each alternative uses to achieve this effectiveness. EPA recognizes uncertainties associated with each approach and has considered the advantages and disadvantages of each approach in its decision. For each approach, these considerations are summarized in the following discussion, beginning with the selected source control alternative.

The selected source control alternative, on-site aeration, is a means of actively and significantly reducing the amount of contamination that remains on the site in a relatively simple and expedient manner. In selecting this alternative EPA has weighed the advantages and disadvantages of this approach as well as the technical concerns associated with applying this remedy to the McKin site. These concerns include (1) attaining non-hazardous levels of contaminants in the soil; (2) confirming a determination of the depth of contamination in contamination Area 3; and (3) maintaining ambient air quality protective of public health once volatile organic compounds in the soil are

exposed to air. While EPA recognizes these concerns and uncertainties, the Agency feels there is sufficient reason to proceed with soil aeration as the source control method with the precautions and provisions described herein and that the benefits of this waste reduction method offset the potential disadvantages associated with technical concerns.

A cap constructed and maintained in a manner consistent with RCRA is an effective means of isolating the soil contamination from the primary transport mechanism of infiltration to the groundwater. Engineering the construction of the cap is a relatively routine process, and measures are established to ensure reliable construction. The major negative factor associated with capping is that wastes remains in-place and are not reduced or eliminated. Essentially, this closure method renders the site a permanent land disposal area. In addition, the effectiveness of capping is dependent in part on monitoring the cap's long-term integrity and, if necessary, taking future maintenance or corrective measures. Cap inspections and groundwater monitoring during the 30-year post closure period would provide substantial assurances that significant leakage is not occurring. Regarding flushing resulting from water table fluctuations, the cap cannot assure containment of those contaminants present below the high water table. Uncertainty regarding the significance of this effect would be minimized by monitoring the effects of this flushing in downgradient monitoring wells, particularly during the period of the remedial treatment unit to extract groundwater immediately downgradient of the cap for treatment. Finally, there are a number of advantages associated with avoiding the soil disturbances associated with soil removal and treatment. These include avoidance of the following: (1) possible uncontrolled volatilization of organic contaminants when soils are exposed to air, (2) confirming a determination of the depth of contamination in contamination Area 3, (3) confirming a determination of the hazardous nature of a treatment end product and the appropriateness and risks of redeposition of this material on-site and off-site.

The primary advantage of incineration is that the contaminant reduction associated with thermal degradation is the most effective destruction technology considered. Incineration of many waste streams is a proven technology, however site specific test burns would be necessary to demonstrate the effectiveness of incineration for several types of on-site contaminated soils. Of the alternatives considered, incineration is the most difficult engineering technique for source control. For on-site incineration, uncertainties, concerning effectiveness would be addressed by testing emissions and combustion efficiency to meet air quality licensing requirements or their technical equivalents. The use of a portable incinerator is a relatively new technology which, as of this writing, has been fully utilized on only a small number of hazardous waste sites and only one Superfund site in an experimental capacity. Significant

time delays can be expected associated with demonstrating incineration effectiveness and safety, on-site scheduling of mobile incineration, or permitting. Based on recent test burns of dioxin contaminated soils in Missouri substantially more site preparation and mobilization effort would be required than estimated in the FS. This would probably include the mobilization of approximately five tractor trailors on temporily foundations, contruction of two temporary buildings and development of water supply and waste water disposal capabilities for quench water. The comments expressed by Maine DEP which call for further "thorough examinations" of the technology to ensure it is effective and implementable reflect a high concern for public health and the environment but suggest what may be a lengthy period before the on-site source is actually controlled. Finally, there are a number of uncertainties that must be addressed in on-site incineration as a technique proposed to treat soils on-site in a batch process. These uncertainties center on:

(1) the possible uncontrolled volatilization of organic contaminants when soils are excavated and exposed to air;
(2) confirming a determination of the depth of contamination in contamination Area 3; and
(3) confirming a determination of the hazardous nature of the ash and the appropriateness and risks of redeposition of ash on-site or off-site.

Off-site disposal alternatives, Alternatives 3A and 3B, share the advantage of off-site incineration in that they remove contamination from the site rather than controlling migration of the waste. In addition, off-site disposal alternatives share with on-site incineration similar disadvantages associated with soil removal. These include (1) possible uncontrolled volatilization of organic contaminants when soil is exposed to air during excavation; and (2) confirming a determination of the depth of contamination in contamination Area 3. An additional disadvantage of off-site disposal is the transfer of the contamination and safe disposal problem to another community. Whether that disposal is via incineration or a secure landfill, there are a number of technical issues to be addressed in that receiving community to ensure adequate protection of human health, welfare, and the environment. In some Superfund cases obtaining the assurance that human health, welfare, and the environment is adequately protected in the off-site facility receiving the waste has lead to time delays in implementing source controls by off-site disposal.

The selected on-site alternative consists of aerating the soil of Areas 1B, 3, 4, 5, and 6 at a rate dictated by maintaining off-site air quality protective of public health. This action includes continously monitoring ambient air, establishing site specific, health based performance standards for soil that will be left on site and establishing a verification

monitoring program to evaluate the appropriateness and attainment of performance standards. If, the soil aeration pilot study demonstrates that soil aeration in specific locations is ineffective in meeting these soil performance standards or infeasible to accomplish while maintaining acceptable ambient air quality, a determination regarding selection of another remedy will be made by the Region Administrator. Regardless of any future determinations, certain removal and site closure activities will be performed including disposal of on-site debris, disposal of discrete areas of significant non-volatile contamination not identified in the RI, disposal of metallic structures, demolition and disposal of the site's building, draining and filling in the lagoon, removal and disposal of known buried drums and their contents, removal and disposal of a buried fuel tank, fencing the site with appropriate signs, loaming the site, and vegetating the site. Regarding the disposal of buried drums, the 16 fiber and steel drums identified in the RI will be disposed of off-site.

In pursuing on-site aeration as a remedial action it is necessary to establish health based, site specific performance standards which represent soil contamination levels which can safely remain on-site following aeration and provide a degree of certainty that these levels can be attained. Health based performance standards must consider each route of exposure including potential groundwater contamination, dermal exposure, soil ingestion and inhalation.

Regarding potential off-site groundwater impacts, a maximum average soil concentration of 0.1 ppm of trichloroethylene, averaged over a treated volume of soil, is judged conservatively to be protective of possible off-site ingestion of groundwater contaminated by the migration of pollutants from residual on-site soil contamination. This value is derived using solute fate and transport modeling to estimate the on-site soil concentration associated with the off-site groundwater concentration protective of human health as drinking water. (This groundwater concentration is judged to be 28 ppb for trichloroethylene based on a 10^{-5} lifetime cancer risk as described in this document's discussion of the selected off-site remedial measure). Calculations, assumptions, and methodologies used in this solute fate and transport modeling are attached to this Summary of Remedial Alternative Selection as Attachment A. As described in this attachment, trichloroethylene is selected as an appropriate organic indicator for this evaluation based on its elevated environmental concentrations, its toxicity relative to other organic chemicals detected in the soil, and other factors. During the pilot soil aeration study, it is possible that the Agency's understanding of the nature and concentrations of organic soil contaminants will improve. Should the soil performance standard of 0.1 ppm for

trichloroethylene or the solute fate and transport modeling provided in Attachment A prove to be inappropriate based on further information regarding mathematical modeling, hydrogeology, or on-site conditions, improved solute fate and transport modeling may be utilized to adjust the trichloroethylene soil performance standard or establish soil performance standards for additional organic compounds.

For those metal contaminants detected in soils at the McKin site, the extraction procedure (EP) toxicity standards contained in 40 C.F.R. §261.24 or the results of similar solute fate and transport modeling using these test results are judged to be protective of public health via groundwater contamination exposures for the McKin site. EPA recognizes that aeration will not effectively remove heavy metal contaminants from soil, however, based on RI soil analysis results it is likely that the above performance standards for metals are attainable without further metal removal.

Regarding the risks associated with dermal exposure with soils, soil ingestion, and inhalation of soil particulate, the Centers for Disease Control has reviewed the soil performance standards previously described and has found that attainment of these performance standards will provide more than adequate public health protection from these exposure routes. This evaluation is based in part on acute and chronic dermal toxicity data.

The extent of volatilization of susceptable compounds from soil during the aeration process is dependent in part on the amount of soil surface area exposed to air and the duration of this exposure. The selected remedy is to aerate soils until the above performance standards are met or exceeded based on random soil sampling of treatment volumes. EPA EPA bases the feasibility of this remedy on theoretical and experimental evidence which demonstrates if aeration is allowed to proceed for sufficient time essentially all volatile organics will volatilize from the soil. Soil aeration has been used to remove volatile contaminants from soil at other locations.

As described in the FS, the rate of aeration will be dictated by ambient air conditions. Ambient air quality will be monitored continuously during soil aeration. If air concentrations approach site specific health based standards developed by the Centers for Disease Control then actions will be taken to abate the volatilization of organics on the site. The practicality and effectiveness of abatement methods will be evaluated during the pilot aeration study. Possible abatement methods to be evaluated during the pilot aeration study include ceasing excavation and soil mixing, covering exposed soil, aerating within an on-site enclosure, and subsurface aeration using a forced soil aeration technique.

An air quality monitoring plan for volatile organics and particulates will be developed during remedial design in order to assure ambient air levels are protective of public health. This plan will rely on multiple continuous air monitors and will stipulate contingency actions to be taken if threshold levels are exceeded. EPA has requested the Centers of Disease Control to establish the necessary threshold levels in consultation with the Maine Bureau of Health. These levels will serve as the basis for the air quality monitoring plan for volatile organics. If these level are violated work will be discontinued and the feasibility of the ongoing process evaluated. The potential for dust generation during on-site aeration also will be evaluated in the pilot treatment study, and dust control measures will be addressed in the remedial design.

Regarding on-site Areas 1A, 1C, and 2, EPA feels there is insufficient evidence to determine the applicability of CERCLA to remedial actions in these areas. Therefore, further soil testing in these areas will be performed during remedial design and a determination of the appropriate remedial response will be made.

Off-site Remedy

Regarding the off-site groundwater contamination, EPA has decided to implement groundwater extraction and treatment as a positive, cost-effective means of restoring the off-site contaminated aquifer and thereby minimizing damage to public health, welfare and the environment. The selected remedy is to extract contaminated groundwater to the extent of technical practicality in order to to restore the off-site contaminated aquifer in a timely manner. Extracted groundwater will be treated and discharged to local surface water. In making this decision, EPA has carefully considered several other off-site alternatives (1) No Action, (2) No Action with Monitoring Alternative 6, (3) Restricting off-site development Alternative 8, (4) Treating recovered water at Boiling Springs and/or the Royal River as proposed by several potentially responsible parties, (5) Less extensive off-site groundwater extraction systems, Alternatives 7A and 7B and (6) the groundwater extraction treatment and recharge system configuration described in Alternative 7C. The basis for EPA's selection is that the Agency sees the groundwater extraction and treatment system selected as the only alternative which is feasible and effective in meeting the remedial action objectives set forth in this Summary of Remedial Alternative Selection.

As previously stated, EPA's remedial action objective regarding off-site groundwater is to restore the off-site aquifer to contamination levels protective of human health and the environment within a reasonable period of time and practical limits. A No Action Alternative for off-site control coupled with the selected source control remedy is likely to restore the contaminated aquifer eventually through natural flushing and dispersion mechanisms. The FS predicts this will occur within about ten years based on a 50 ppb total volatile organic chemical target concentration. Given the feasibility of restoring the aquifer in a shorter period of time with an extraction and treatment system, the uncertainty in this ten year estimate, and the possibility of other, less mobile constituents in the groundwater, EPA has determined that a No Action Alternative, the No Action with Monitoring Alternative and No Action with both monitoring and restrictions on future development alternatives are not responsive to correcting the present levels of contamination that have migrated from the site and that these alternatives are not effective in meeting the remedial action objectives. Furthermore, EPA recognizes the contaminated aquifer as an environmental resource and finds a No Action Alternative to be inadequate protection of the environment.

Alternative 8, restricting future development in affected areas, is aimed at ensuring that no one will be exposed to water from the contaminated aquifers. This alternative was not selected because of the difficulty and uncertainty of guaranteeing the implementation and enforcement of such restrictions for the time period until safe water quality levels are achieved. Moreover, this alternative does not seek to mitigate or minimize the threat to the environment. Notwithstanding this decision, EPA requests the State and Town to take measures to ensure that the contaminated aquifers are not used as a water supply during the period of aquifer restoration.

E. C. Jordan, a technical consultant to a potentially responsible party, has suggested an off-site alternative which possibly includes the treating of water as it discharges from the contaminated aquifers at Boiling Springs, the Royal River or both. Based on available information, EPA has determined that this off-site alternative is neither directed nor responsive to the objective of restoring the off-site aquifer that is presently contaminated. The objective of this proposed alternative appears to be protection of surface water quality and uses. EPA shares this objective with the commentors but

has determined from the present evidence that this objective is being met currently without treatment at the groundwater discharge location in the area of the Royal River.

Alternatives 7A and 7B as described in the FS represent groundwater extraction and treatment systems less extensive than Alternative 7C. EPA has determined that the intent of the selected Alternative is to restore the contaminated aquifer in a timely manner to the extent of practical feasibility, and Alternatives 7A and 7B were not selected because Alternative 7C was viewed as a more extensive treatment alternative.

Comments received from local citizens and elected officials either endorsed a groundwater extraction system as an off-site control or were silent with respect to an endorsement. Comments from potentially responsible parties were opposed to the groundwater and the extraction system proposed in the FS. Major reasons for this opposition include the views that the system is unnecessary to protect adequately public health since an alternative drinking water supply is in use and appears to meet additional future needs and that the system is not cost-effective compared to implementing source controls and allowing natural mechanisms to cleanse the aquifer. EPA recognizes that the existing public water supply greatly reduces the public health risk associated with the contaminated aquifer, but is not confident that long-term institutional restrictions could be implemented and enforced on the affected land to ensure that contaminated groundwater is not utilized. Furthermore, EPA's selection of the effective off-site remedial action is based on the NCP standard of effectiveness which provides for adequate protection not only of public health and welfare but also of the environment. The contaminated aquifer is a former and potential environmental resource. Restoration of this environmental resource which was degraded by the migration of contaminants from the McKin site is consistent with provisions of other Federal laws (i.e. the 1984 RCRA Amendments) as well as the EPA Groundwater Protection Strategy. The National Contingency Plan requires EPA to select the the remedial alternative which the Agency determines is cost effective. In the case of this contaminated aquifer, EPA has determined that expedient restoration to the extent practical as provided by a groundwater extraction and treatment system is the only off-site alternative which meets this standard of effectiveness, and therefore, this alternative is the cost effective alternative.

EPA has studied comments received from Maine DEP and potentially responsible parties which raise technical concerns associated with Alternative 7C as described in the FS. These technical concerns include:

- the abililty of attaining the projected well yields at the described locations due in part to questionable saturated thickenesses in the aquifer in these locations.

- the feasibility of discharging treated groundwater on the site as described in the FS which may cause unacceptable adverse environmental effects.

- the appropriateness of groundwater modeling assumptions.

- the possible creation of a stagnant zone of contaminated groundwater between Mayall Road and Boiling Springs.

On the basis of EPA's review of these concerns the Agency has sufficient reason to question the feasibility of Alternative 7C as proposed in the FS with its specified extraction well and discharge locations. Therefore, the Agency does not consider Alternative 7C to be an effective off-site alternative at this time. EPA feels, however, that the above concerns can be adequately addressed in the selected groundwater extraction and treatment alternative and finds the selected off-site control alternative to be reliable and effective.

Regarding the discharge of treated groundwater, this discharge will be to local surface water rather than to on-site groundwater as proposed in Alternative 7C. Regarding the other concerns listed above, although EPA feels that the selected extraction and treatment system is the cost effective remedy, more precise determinations regarding well yields, modeling assumptions, and groundwater flow will be made during the remedial design. Available well logs presented in the RI, permeability generally associated with the surficial materials presented in these logs, and recent pump test and hydraulic conductivity data collected at the site further demonstrate that an effective groundwater extraction system can be constructed in the contaminated aquifer. This recent pump test indicates a significantly greater permeability than assumed by potentially responsible parties in their comments regarding the infeasibility of a groundwater extraction system. The remedial design will include field tests to characterize more accurately the off-site contamination plume between the site and its surface water discharge and to determine well yields, drawdowns, saturation thickness, and the most effective placement and pumping rates of the extraction wells. A degree of flexibility in the extraction and treatment systems is allowable based on design studies in order to achieve the objectives of the remedial action and the concepts of design outlined in the FS. Areas of flexibility include the number of wells, the location of wells, and the need for the three series of extraction wells as proposed in Alternative 7C if significant increased effectiveness as a result of additional wells cannot be demonstrated.

Another area of study during the remedial design is a treatability study using the contaminated groundwater. This treatability study will address all priority pollutants in

determining an effective treatment design. A five-year period of groundwater extraction and treatment is being stipulated in this decision as a remedial treatment unit.

Relative to the off-site remedy, performance standards are established in this decision to be achieved by the five-year remedial treatment unit for the two detected groundwater contaminants. The performance standards set for the extraction and treatment system at the McKin site are 92 ppb of 1,1,1-trichloroethane and 28 ppb trichloroethylene applicable throughout the aquifer contaminated affected by the migration of these chemicals from the McKin site. These performance standards are based on levels that protect human health, welfare and the environment at this site with consideration to potential exposures and possible synergistic or additive effects. Regarding protection of the aquatic environment, the risk to surface water use of the Royal River presently does not appear to be significant and will not increase with the attainment of these performance standards.

EPA has determined that exposures at or below these performance standard levels at this site will be at levels which do not pose a substantial threat to human health and the environment. The trichloroethylene performance standard is based on a cancer risk of 10^{-5} (i.e., that a person exposed to this level of contamination in drinking water throughout his or her lifetime (70 years) will bear an increased risk of less than or equal to 1 in 100,000 of contracting cancer as a result of ingesting trichloroetheylene). EPA recognizes trichloroethylene as a suspected carcinogen and has made a determination of its performance standard for this site through the risk management process. In general, the Agency has made decisions to reflect specific situations to allow concentrations of suspected or known carcinogens where the individual risk values have been within a range of 10^{-8} to 10^{-4}. In selecting 10^{-5} as the appropriate lifetime statistical cancer risk value within this range, EPA has considered the following site specific factors:

- There will be a relatively low level of uncertainty regarding the levels of contamination in the affected aquifers following five-years of monitoring local groundwater, surface water, and the effectiveness of the extraction and treatment system.

- There is presently no known regular human use of the contaminated aquifer, a situation which is expected to continue based on the availability of an alternative drinking water supply. The areas of the most concentrated contamination are developed areas least likely to utilize the aquifer for a drinking water supply by developing new private wells.

- Based on the physical and chemical characteristics of the waste (mobile organic solvents), the hydrogeological characteristics of the site (fractured bedrock and relatively permeable surficial material in areas of greatest contamination), and the groundwater flow rate and direction, natural attentuation mechanisms are expected to diminish groundwater contamination further in areas where the extraction and treatment system is successful following the five-year remedial treatment unit. Based on these factors, this further decrease in contamination levels is expected to reduce further the lifetime cancer risk relatively rapidly.

- The groundwater extraction and treatment system is expected to be effective and reliable in attaining the performance standards.

- The models used in calculating public health risks were structured to be conservative in nature.

The 1,1,1-trichloroethane performance standard is based on the recommended maximum concentration limit (RMCL) of 200 ppb, as a toxic, non-carcinogenic contaminant having a threshold. The 200 ppb level is adjusted to a performance standard of 92 ppb based on a consideration of possible synergistic or additive effects with trichloroethylene. This adjustment is based on the fractional approach for estimating guidance levels for multiple toxicant exposure. This approach assumes additive and similar systemic effects. The determination of the 92 ppb performance standard for 1,1,1-trichloroethane is calculated from: (1) a 52 ppb adjusted acceptable daily intake (ADI) level for trichloroethylene in drinking water; (2) the 28 ppb performance standard for trichloroethylene previously described; and (3) the 200 ppb recommended maximum concentration limit for 1,1,1-trichloroethane.

The extraction and treatment system selected in this decision is a five-year remedial treatment unit. If at the end of this five-year treatment period the performance standards are not achieved, an evaluation of the system, concentration limits, and public exposures will be made. In this case, following this evaluation, the Regional Administrator with concurrence from the State of Maine will make a decision regarding appropriate actions. This decision may mandate continued operation of the system beyond the remedial treatment period. The remedial treatment unit will be allowed to operate less than the five-year period only after the performance standards are achieved or after a determination and decision regarding the treatment system, potential exposures, or concentrations limits is made by the Regional Administrator with concurrence from the State of Maine.

In association with the selected source control and off-site remedial actions, groundwater and surface water monitoring programs will be developed in order to evaluate the effectiveness of the actions, verify predictive modeling assumptions, and monitor concentrations in the groundwater plume and receiving surface water. New groundwater monitoring locations may be developed for this program if warranted.

OPERATIONS AND MAINTENANCE (O&M)

Regarding the source control remedy, operation and maintenance (O&M) actions associated with on-site aeration of the contaminated areas involve site maintenance activities such as mowing. Projected O&M costs as estimated in the FS as $1,600 per year. Operation and maintenance costs for groundwater quality verification monitoring is included in the cost estimate for the off-site remedy.

Regarding the off-site remedy, the groundwater extraction and treatment system is selected as a remedial treatment unit to treat contaminated groundwater for a five-year period. As such, no operation and maintenance costs are associated with this remedy during this five-year period. Performance standards have been established to be achieved in this five-year treatment. If they are not achieved, the performance standards and method of achievement at the McKin site will be evaluated at the completion of the treatment unit. That evaluation may include a commitment to take further corrective action to remedy groundwater contamination, and O&M costs may be associated with these future actions. However, with the present expectations of a successful remedial treatment unit, there are no O&M costs associated with the remedial action decision for the off-site groundwater contamination, outside of continuing groundwater monitoring costs. The purpose of this program is to monitor the effectiveness of the source control alternative and the extraction and treatment system. Costs for initiating and utilizing a groundwater and surface water monitoring program during the five-year treatment unit are associated with the construction of the remedial action treatment unit and are not considered operation and maintenance costs. Continuation of the monitoring program beyond the remedial treatment unit will result in operation and maintenance costs estimated to be $37,300 per year.

The state has made a commitment to provide the operation and maintenance costs to fund surface water and groundwater monitoring and on-site maintenance after completion of the five-year remedial treatment unit. Assuming a successful five-year groundwater remedial treatment unit, these costs are estimated at $38,900 per year. The state funding mechanism is the Uncontrolled Hazardous Substance Site Bond Account, and the Maine Department of Environmental Protection is the state agency responsible for O&M.

SCHEDULE

The following are the key milestones and dates for implementation of the selected remedy:

Approval Remedial Action (sign ROD)	July 18, 1985
Award Contract for Design	July 19, 1985
Start Design	July 19, 1985
Complete Aeration Pilot Study and Design to a Reasonable Cost Estimate	September 6, 1985
Obligate Funds for Construction	September 20, 1985
Complete Design	March, 1986
Start Construction	May, 1986
Begin Remedial Treatment Unit for Treatment of Groundwater	1986
End Remedial Treatment Unit	1991

FUTURE ACTIONS

A sufficient characterization of the soils and petroleum wastes in on-site contamination Areas 1A, 1C, and 2 is not available at this time. Soil testing in these areas will be performed during remedial design to determine the applicability of CERCLA to these areas and the appropriateness of including these areas in the remedial response described herein.

Regarding the selected source control remedy, a pilot soil aeration study will be performed during remedial design. If during this pilot study or during the remedial action, it is determined that soil aeration of the contaminated areas identified in FS cannot be performed in a manner protective of public health and the environment, a determination regarding the selection of another source control remedy will be made by the Regional Administrator. This determination is a possible future action.

As additional possible future actions, a re-evaluation of performance standards for off-site groundwater contamination levels or the on-site soil contamination levels may be necessary. Regarding off-site groundwater contamination levels, any decision to alter these performance standards based on such an evaluation would be made by the Regional Administrator. It is anticipated that this evaluation will be made if necessary, at the conclusion of the five-year remedial treatment unit based in part on information gathered from the off-site groundwater and surface water monitoring program. If site conditions warrant, a reevaluation and decision can be made by the Regional Administrator at an earlier date. Such site conditions include the performance of the extraction and treatment system, off-site groundwater contamination levels, and exposures to and impacts of the contaminated water. This decision may include additional remedial actions to ensure adequate protection of public health, welfare or the environment.

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McKIN SITE , GRAY MAINE

REGIONAL MAP

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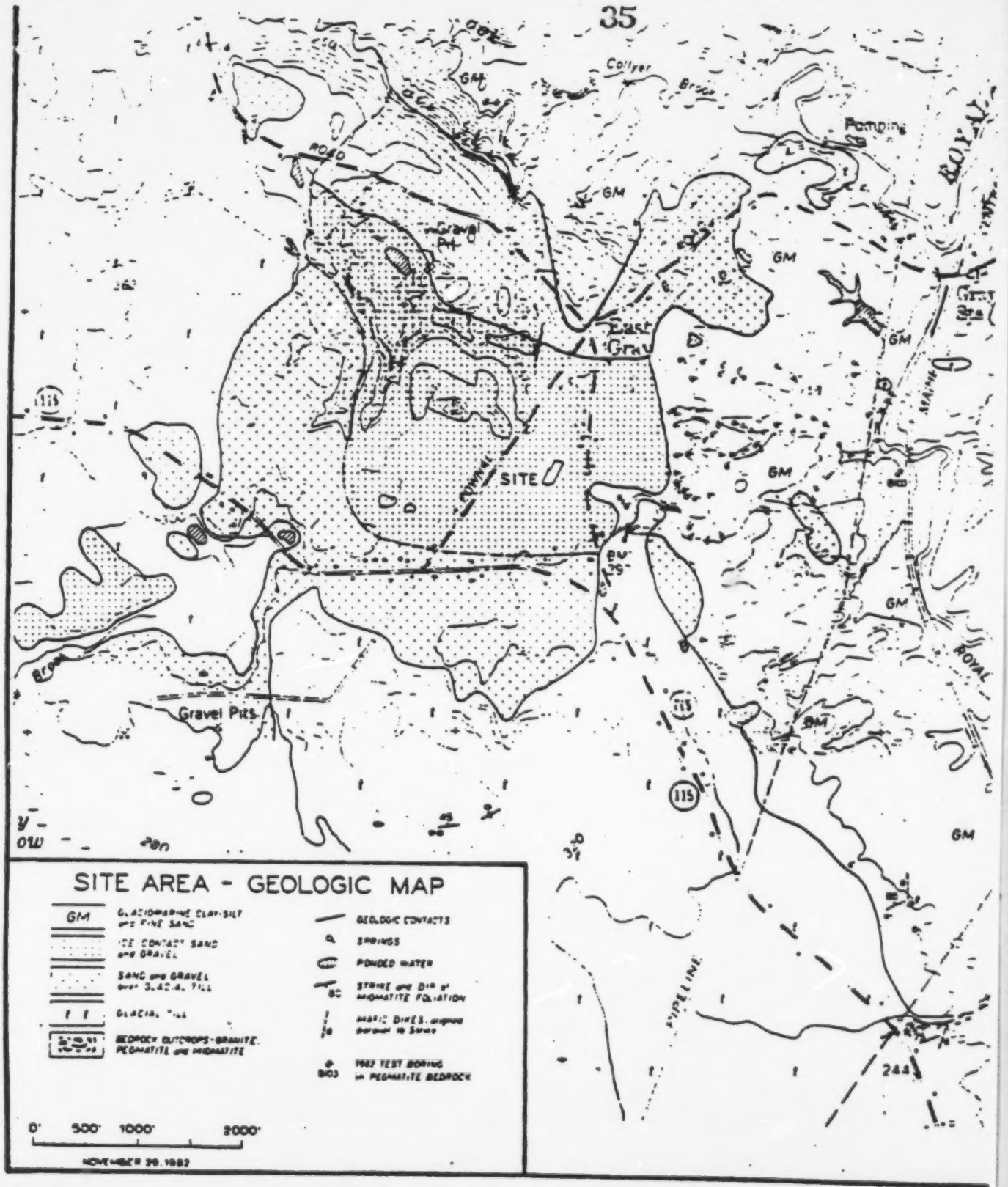
FIGURE



McKIN SITE, GRAY MAINE

McKIN SITE AREA GEOLOGIC MAP

(1982 GERBER HYDROGEOLOGIC STUDY)

N

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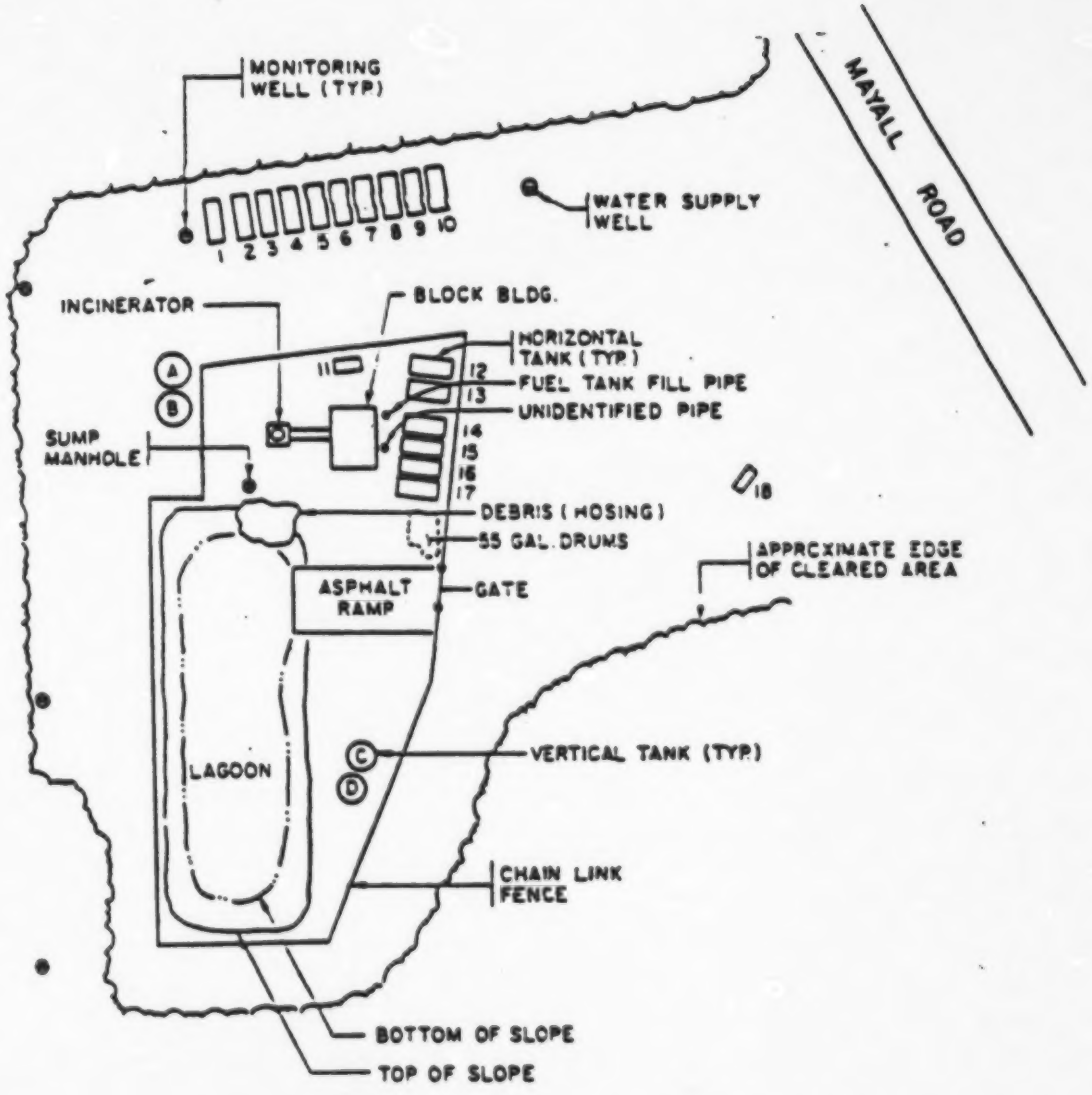
FIGURE 2



APPROXIMATE SCALE: 1" = 100'

McKIN SITE GRAY, MAINE

SITE PLAN

N TRUE

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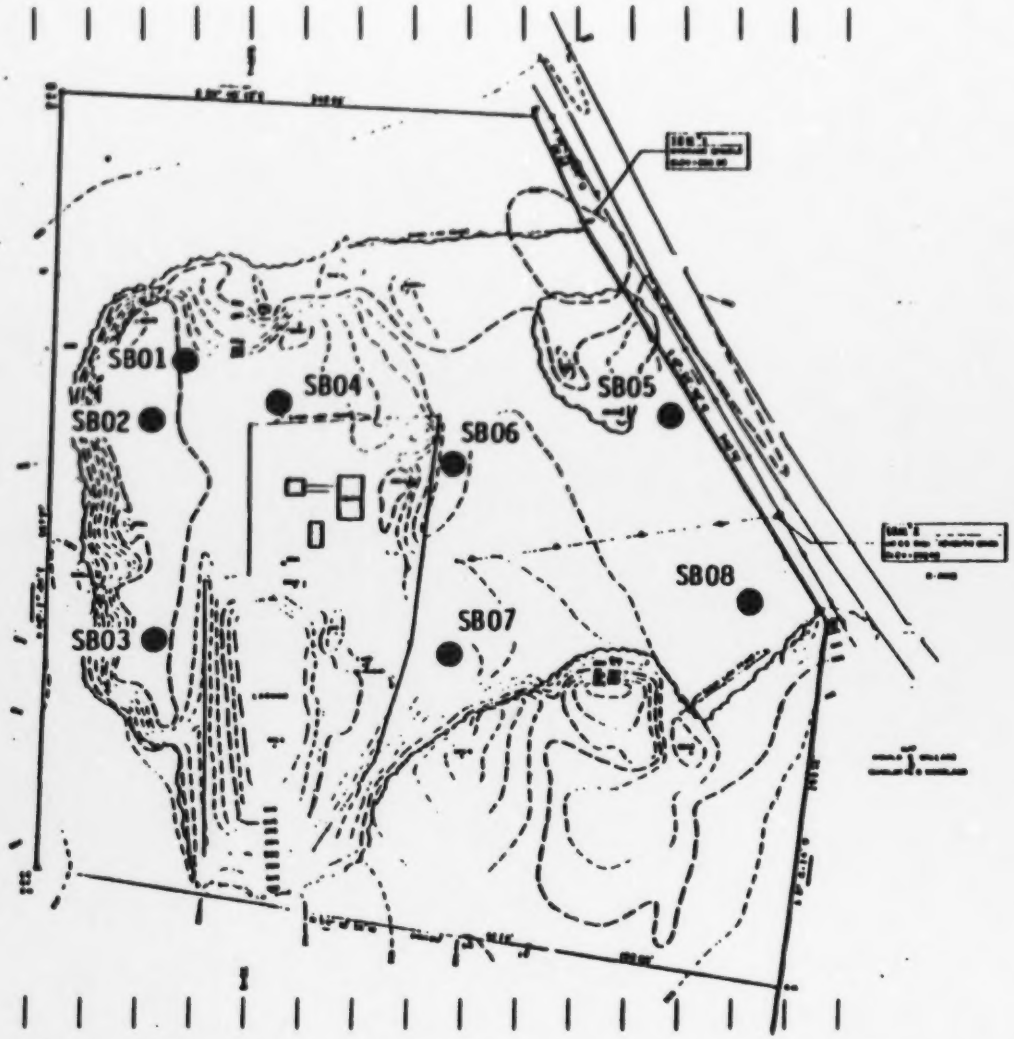
FIGURE



NOTES

SCALE

KEY

● BORING LOCATIONS

McKIN SITE, GRAY MAINE

McKIN ON-SITE SOIL BORING LOCATIONS
(MARCH 1984)

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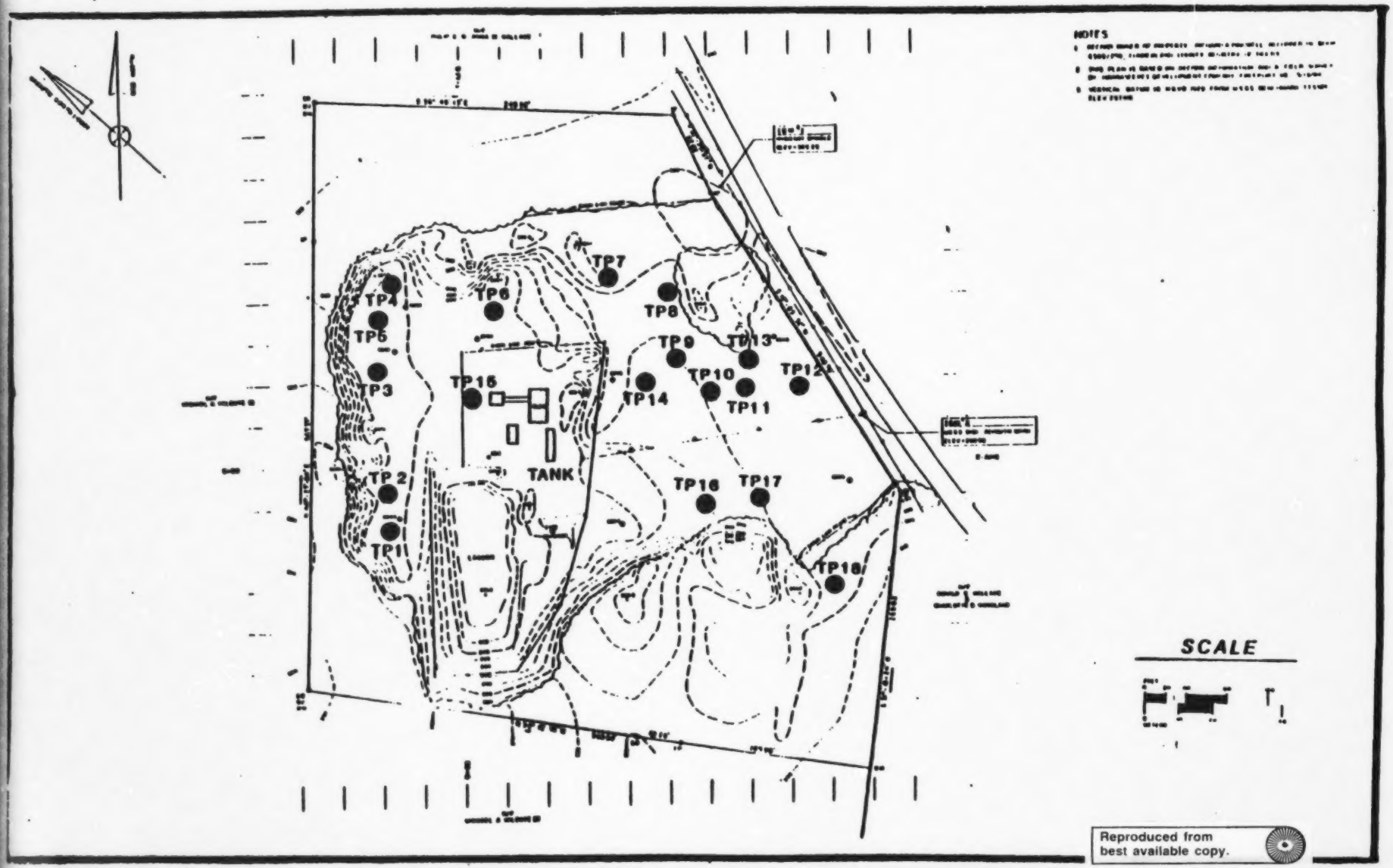
FIGURE 4

37



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McKIN SITE, GRAY MAINE

TEST PIT LOCATIONS FOR EXPLORATORY
EXCAVATION PROGRAM

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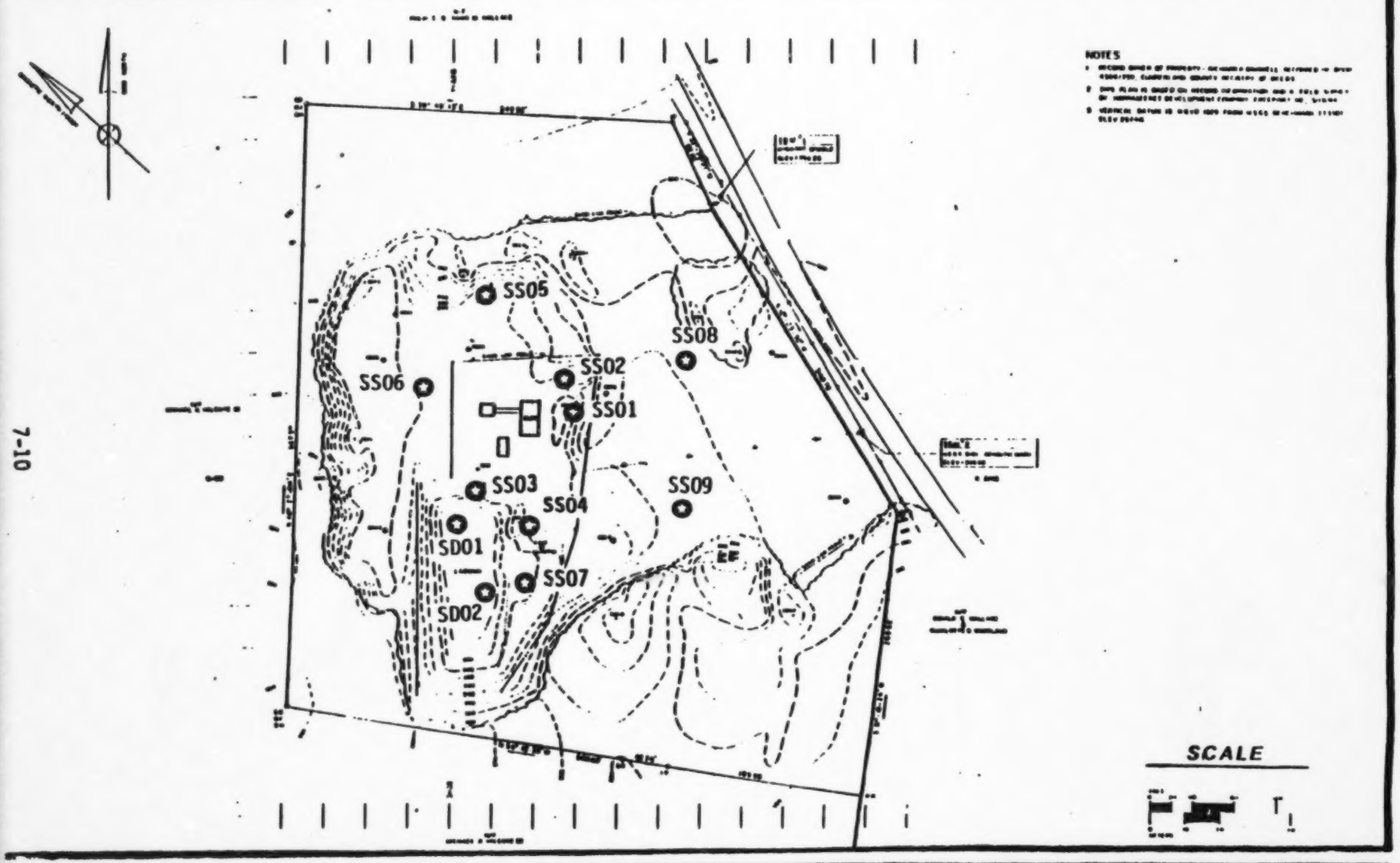
Figure 5



7-10

39

McKIN SITE, GRAY MAINE

LOCATIONS OF HAND AUGER BORINGS (APRIL 1984)

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FIGURE 6

TABLE 2

LABORATORY ANALYTICAL RESULTS OF ON-SITE QUALITY MONITORING (mg/kg)

Sample Location	Sample Number	Depth (Feet)	DICHLOROETHYLENE	METHYLENE CHLORIDE	TRICHLOROETHYLENE	111-TRICHLOROETHANE	TETRACHLOROETHYLENE	ETHYL BENZENE	XYLENES	DICHLOROBENZENE	TOLUENE	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	MERCURY	SELENIUM	SILVER
SS01	1	0-1	ND	ND	ND	ND	ND	ND	ND	ND									
SS01	2	3	ND	ND	ND	ND	ND	ND	ND	ND									
SS01	3	11-12	ND	ND	ND	ND	ND	ND	ND	ND									
SS01	4	6-7	ND	ND	ND	ND	ND	ND	ND	ND									
SS01	5	11-12																	
SS02	1	0-2	7.0	--	1500	2.1	5.0	.24	21	9.2		9.0	<25	<2.5	7.5	2.0	<0.1	2.6	<2.0
SS03	1	0-1	ND	ND	ND	ND	ND	ND	ND	ND									
SS04	1	0-1	ND	ND	ND	ND	ND	ND	ND	ND									
SS05	1	0-2	ND	--	240	ND	16	250	580	30									
SS05	2	0-2	ND	--	17	ND	9.9	200	570	87									
SS0501	3	10-11		ND	.52	ND	.27	>33	>6.7	13									
SS0502	4	14-15		ND	2.9	ND	.12	.05	.10	1.7									
SS0502	5	14-15																	
SS0502	6	14-15										15	<25	<2.5	7.5	1.0	<0.1	3.2	<2.0
SS06	1	0-1		ND	ND	ND	ND	ND	ND	ND		10	<25	<2.5	11	1.0	<0.1	2.5	<2.0
SS06	2	4-5		ND	ND	ND	ND	ND	ND	ND									
SS07	1	2-3		ND	ND	ND	ND	ND	ND	ND									
SS08	1	3-4		ND	ND	ND	ND	ND	ND	ND									
SS08	2	3-4		ND	0.05	ND	ND	ND	0.03	ND									
SS08	3	3-4		ND	ND	ND	ND	ND	ND	ND									
SS08	4	3																	
SS08	5	3										10	<25	<2.5	7.5	2.2	<0.1	<2.5	<2.0
SS09	1	6		ND	ND	ND	ND	ND	ND	ND		13	<25	<2.5	9.5	4.4	<0.1	<2.5	<2.0
SS09	2	3-4		ND	ND	ND	ND	ND	ND	ND									
SS09	3	3-4		ND	ND	ND	ND	0.04	0.22	ND									
SS09	4	3																	
SB01	1	5-6			ND	ND		ND	ND	ND		3.0	<25	<2.5	3.0	<1.0	<0.1	<2.5	<2.0
SB01	2	10-11			ND	ND		0.02	ND	0.17									
SB02	5	25-26			ND	ND		ND	ND	ND									
SB03	1	5-6			ND	ND		ND	0.02	1.2									
SD01			ND	ND	ND	0.01	ND	ND	ND	ND									
SD02			ND	ND	ND	ND	ND	ND	ND	ND									
TP1A	1A		<.1		560*	0.3*		220*	150*		0.9*								
TP4A	4A		<.1		<.1	<.1		<.1	<.1		<.1								
TP4B	4B		<.1		<.1	<.1		<.1	<.1		<.1								
TP6A	6A		49		1400*	4.5*		1.0*	a		0.6*								
TP9B	9B		<.1		<.1	<.1		<.1	<.1		<.1								
TP13A	13A		<.1		<.1	0.4*		0.4*	1.7*		<.1								
TP13B	13B		<.1		<.1	0.9*		0.3*	0.5*		1.0*								
TP15	15**							>10	>30	>10	>10								

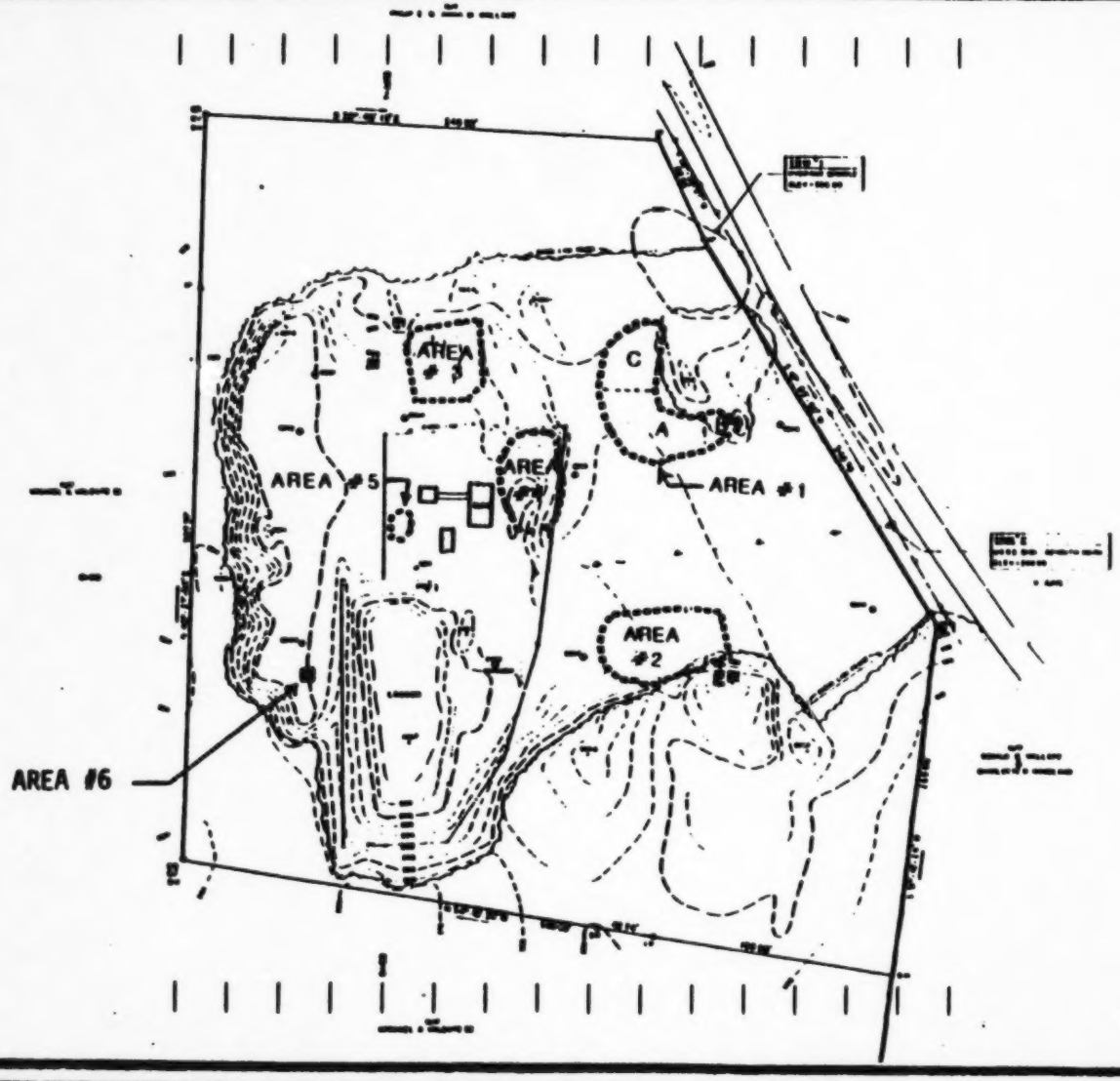
* Approximately

** Sample taken July 10, 1984, analyzed September 4, 1984 due to delay specific concentrations are unknown

a = Xylene not analyzed for in this sample.

ND = Below Detection Limits.

b = Field Blank



McKIN SITE, GRAY MAINE

PRIMARY AREAS OF SHALLOW SOIL CONTAMINATION

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FIGURE 7

TABLE 2

SUMMARY OF SIGNIFICANT CONTAMINATED SOIL AREAS

Area	Description of Contamination**	Estimated Dimensions		
		Surface Area (s.f.)	Depth (ft.)	Volume (c.y.)
Area 1B	Grey and black sludge (see TP13A & TP13B Lab Tests)	400	5	74
TP# 1A (Area 6)	Soil Around Buried Drum (See Figure 6-1)	9	3	1
Area 3	See TP6A Lab Tests	1,500	40*	2222
Area 4	See SS01 & SS02 Lab Tests	3,200	3	356
TP# 15 (Area 5)	See TP15 Lab Tests	100	2	8
	TOTAL	5,209		2661
		ESTIMATE 5,200 s.f.		ESTIMATE 2,700 c.y.

NOTES:

1. Areas 1A, 1C, and 2 were not determined to be significantly contaminated based on laboratory analysis and physical observations. The major contaminants in these areas appear to be typical derivatives of petroleum refining and not covered under CERCLA.

2. The estimated depth for Area 1B is estimated as debris would not allow auger penetration. The remaining depths are estimated based on physical/visual field observations.

* Due to limitations of sampling device exact depth of contamination cannot be determined, therefore the depth to groundwater was used as a conservative figure.

** See Table 1-2 for lab test results.

TABLE 3

LOCATION AND TYPE OF BURIED DRUMS TO BE REMOVED

Location[1]	Number of Known Drums[2]	Type of Drum
TP-1	1	Deteriorated Fiber w/LID
TP-4	8(4)	Metal
TP-6	3(2)	Fiber
TP-8	1	Metal
TP-9	3(2)	2 Metal-1 Deteriorated Fiber
TOTAL	16(8)	

[1] see Figure 6-1

[2] Numbers in parentheses denote contingency quantity for possible unknown drums.

ANALYSIS OF CONTAMINATED SOIL ASSOCIATED WITH DRUMS (ppm)

	LOCATION				
	TP-1	TP-4	TP-6	TP-8	TP-9
Dichloroethylene	<0.1	<0.1	49	*	<0.1
1,1,1-Tricholorethane	J0.3	<0.1	J4.5	*	<0.1
Trichloroethylene	J560	<0.1	J1400	*	<0.1
Ethyl benzene	J220	<0.1	J1.0	*	<0.1
Xylene	J150	<0.1	----	*	<0.1
Toluene	J0.9	<0.1	J0.6	*	<0.1

*No sample taken

J - Approximately

TABLE 4

COMPOUNDS ANALYZED IN GROUNDWATER SAMPLES*

ACROLEIN
ACRYLONITRILE
BENZENE
CARBON TETRACHLORIDE
CHLOROBENZENE
1,2-DICHLOROETHANE
1,1,1-TRICHLOROETHANE
1,1-DICHLOROETHANE
1,1,2-TRICHLOROETHANE
1,1,2,2-TETRACHLOROETHANE
CHLOROETHANE
2-CHLOROETHYL VINYL ETHER
CHLOROFORM
1,1-DICHLOROETHYLENE
TRANS-1,2-DICHLOROETHYLENE
1,2-DICHLOROPROPANE
TRANS-1,3-DICHLOROPROPYLENE
CIS-1,3-DICHLOROPROPYLENE
ETHYLBENZENE
METHYLENE CHLORIDE
CHLOROMETHANE
BROMOMETHANE
BROMOFORM
DICHLOROBROMOMETHANE
TRICHLOROFLOUROMETHANE
DICHLORODIFLOUROMETHANE
CHLORODIBROMOMETHANE
TETRACHLOROETHYLENE
TOLUENE
TRICHLOROETHYLENE
VINYL CHLORIDE

* Of all the compounds analyzed for only 1,1,1-trichloroethane and trichloroethylene were detected.

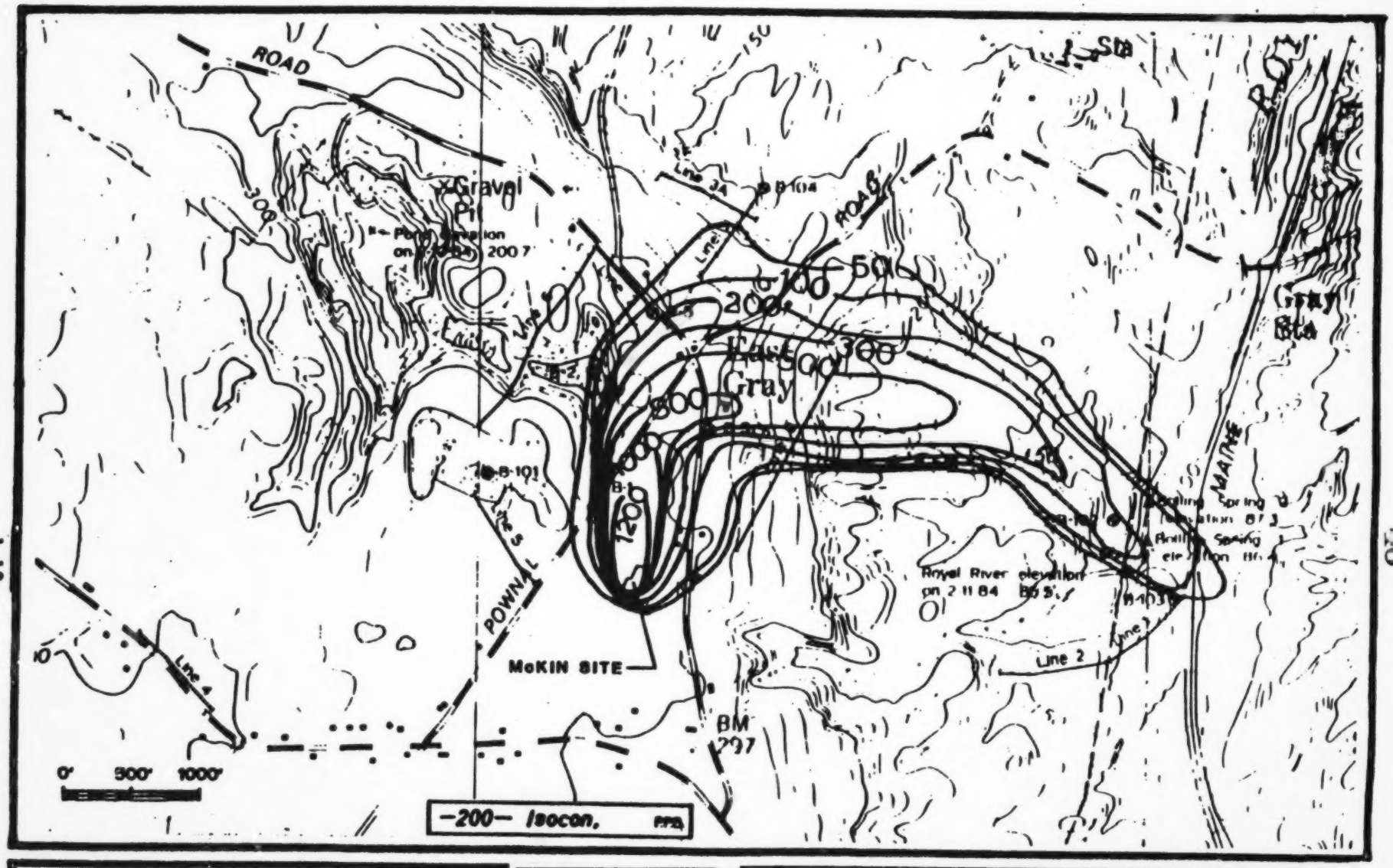
TABLE 5

LABORATORY ANALYTICAL RESULTS
OF GROUNDWATER QUALITY MONITORING

Location	Date (1984)	1,1,1 Trichloroethane (ppb)	Trichloroethylene (TCE) (ppb)
B-1 (shallow soil)	3/21	170** (230)	16,000
B-1 (bedrock)	3/21	470** (500)	29,000
B-2 (shallow soil)	3/22	9	91
B-2 (deep soil)	3/22	16	160
B-2 (bedrock)	3/22	5	56
B-3 (shallow soil)	3/20	65	1,800
B-3 (bedrock)	3/20	3	120
B-4 (deep soil)	3/21	ND	ND
B-5 (deep soil)	3/20	ND (ND)*	ND (ND)*
B-5 (bedrock)	3/16	7 (8)*	190 (177)*

* duplicate
ND = not detected

** These samples were diluted for the analysis of trichloroethylene. The companion results in parentheses for 1,1,1-trichloroethane are for the undiluted sample.



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STEADY STATE SURFICIAL AQUIFER (1984)
1,1,1-TRICHLOROETHANE CONTAMINANT PLUME

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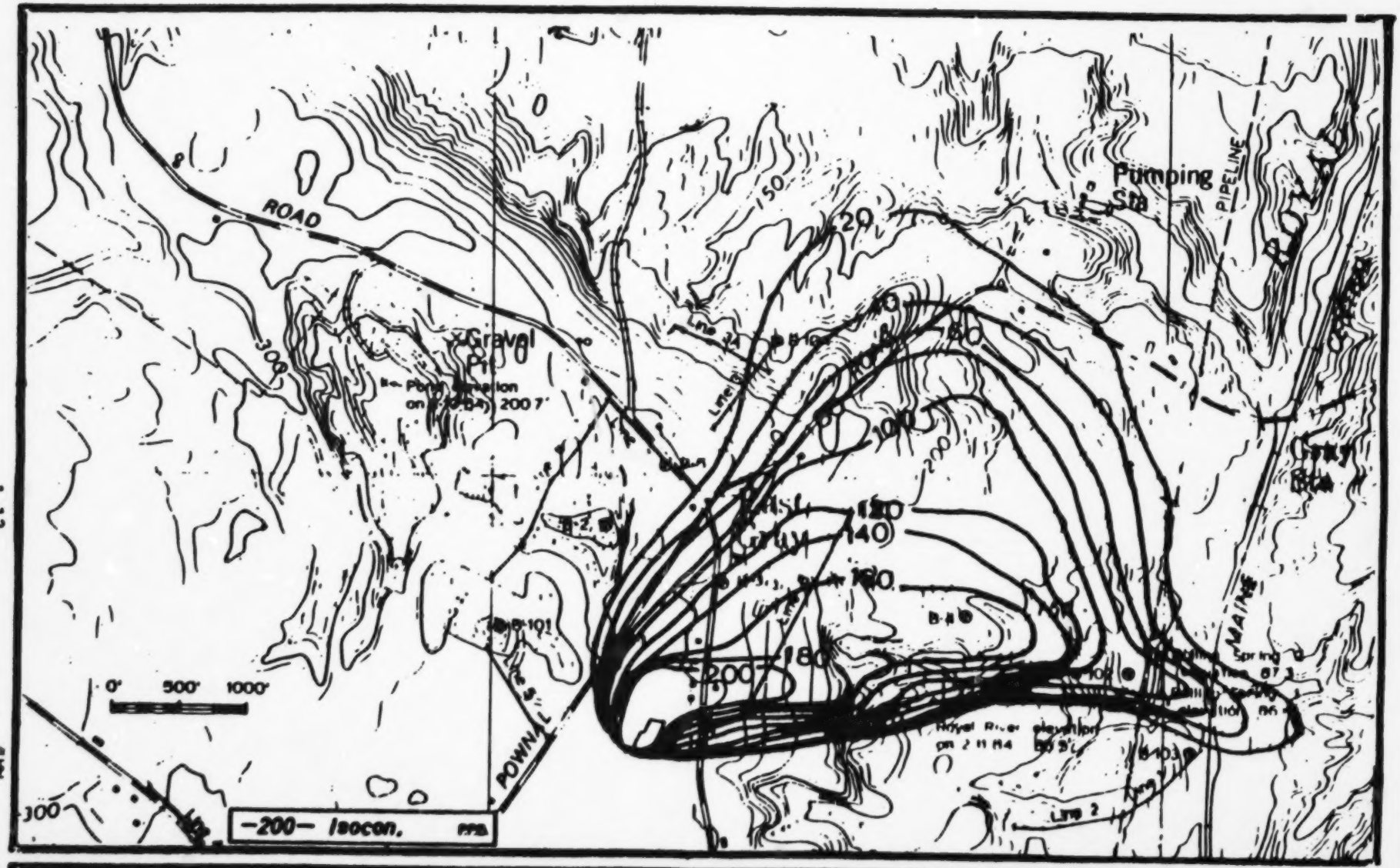
FIGURE 9



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STEADY STATE BEDROCK AQUIFER (1984)

1,1,1-TRICHLOROETHANE CONTAMINANT PLUME

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FIGURE 10

APPROXIMATE SCALE 1" EQUALS 1600'

KEY

● SAMPLING LOCATION

FIGURE 11

TABLE 6

LABORATORY ANALYTICAL RESULTS OF
SURFACE WATER QUALITY MONITORING

Location	Date (1984)	Trichloroethylene (TCE) and 1,1,1 Trichloroethane (ppb)
SW-1	3/16	ND (ND)*
SW-2	3/16	ND
SW-3	3/16	ND
On-site lagoon	4/11	ND
Boiling Springs	4/11	44 (TCE) and 30
	4/11	32 (TCE) and 10 **

* duplicate
** second Boiling Springs sample
ND = not detected (detection limit = 1 ppb)

TABLE 7A

McKIN COMPANY SITE, MAINE

SOURCE CONTROL REMEDIAL ALTERNATIVES

Alternative	PROJECT COST ($1,000) Capital	O&M	Present Worth	Public Health Considerations	Environmental Considerations	Technical Considerations	Public and Elected Officials Comments
1. No Action with/ Monitoring	20	37.3	242	Continued contamination of groundwater by contaminated soils remaining on-site.	No Source Control. Continued contamination of groundwater. Relatively rapid leaching with source continuing for at least 25 years.	Adjustments in Remedial Action may be required based on response to monitoring. Inconsistent w/RCRA. O&M required for groundwater monitoring.	Unacceptable. Not responsive to problem.
2. Capping Contaminated Areas[1]	192	38.9	430	Groundwater remains contaminated although additional contamination is eliminated. No excavation required therefore no emissions.	Effective source control. Inhibits migration. No waste reduction. Groundwater 20-40 ft. below surface. Low water table eliminates impact of fluctuating water table elevation.	High reliability w/proper installation and long-term maintenance. Low level of technology required. Meets RCRA requirements. Long-term O&M required to ensure long-term effectiveness. Estimated construction period-90 days.	Acceptable to some. Some very opposed due to lack of source reduction. Clay cap preferred to synthetic.
3A. Limited Excavation w/Off-Site Landfilling	1,847	1.6	1,863	Eliminates future generation of contaminated groundwater. Groundwater still contaminated. Potential risk due to emissions during excavation. Transfers hazard to off-site location.	Effective source control via source removal. Site regrading required. Potential for contamination during transport or as result of off-site landfilling.	Reliability dependent on contamination boundary definition and availability of off-site landfill. Low level technology required on-site. RCRA Compliance assuming Licensed Transporter and Landfill. Each load of soil must be characterized. Air Monitoring required. Minimum long-term O&M. Estimated excavation period-90 days.	No Comment. Assumed Acceptable.
3B. Limited Excavation w/Off-Site Incinerators	5,087	1.6	5,103	Same as Alt. 3A, except that EPA and State permitted incinerator must be used.	Same as Alt. 3A, except no off-site potential contamination at landfill.	Reliability dependent on contamination boundary definition and permit status of incinerator. RCRA Compliance assuming Licensed Transporter and Incinerator and non-hazardous ash. High level of mechanical technology required. Air monitoring required. Minimal long-	No Comment. Assumed Acceptable.

TABLE 7A

McKIN COMPANY SITE, MAINE

SOURCE CONTROL REMEDIAL ALTERNATIVES

(CONT'D)

Alternative	PROJECT COST ($1,000) Capital	O&M	Present Worth	Public Health Considerations	Environmental Considerations	Technical Considerations	Public and Elected Officials Comments
						term O&M required. Each load of soil requires characterization. Estimated excavation period-90 days.	
4. Limited Excavation w/On-Site Incineration and Disposal[2]	6,840	1.6	6,856	Eliminates future generation of contaminated groundwater. Groundwater still contaminated. Potential risk due to emissions during excavation and incineration.	Effective source control via source removal. Environmental assurances of stack emissions, incineration efficiency and production of a non-hazardous ash required. Obtaining permits may be time consuming. Treatability (Test Burn) information required. Site regrading required.	Reliability dependent on contamination boundary definiton and permitting issues. RCRA Compliance assuming either permit obtained or technical equivalency shown and non-hazardous ash. Each load of soil requires characterization. Air monitoring required. Minimal long-term O&M required. High level of mechanical technology required. Estimated incineration period-180 days.	Acceptable and favored by some. Opposed by some based on potential air emissions.
5A. Limited Excavation[3] w/On-Site Aeration and Disposal*	424	1.6	440	Eliminates future generation of contaminated groundwater. Groundwater still contaminated. Air emissions during aeration are potential hazard.	Effective source control via source removal. Environmental assurances of treatment efficiency and non-hazardous residual soil required. Significant odors produced temporarily during aeration.	Reliability dependent on contamination boundary definiton. Design pilot study required to determine treatment effectiveness. RCRA Compliance assuming effective treatment obtained. Soil requires testing after treatment. Action limits and testing procedures need to be established. Low level of mechanical technology required during aeration. Extensive air monitoring required. Minimal O&M. Estimated aeration period-40 weeks spread over a 2 year period.	Little or no public acceptance.

TABLE 7A

McKIN COMPANY SITE, MAINE

SOURCE CONTROL REMEDIAL ALTERNATIVES

(CONT'D)

Alternative	PROJECT COST ($1,000) Capital	O&M	Present Worth	Public Health Considerations	Environmental Considerations	Technical Considerations	Public and Elected Officials Comments
5B. Limited Excavation w/Off-Site Aeration and Disposal	246	1.6	262	Same as Alt. 5A, except hazard is transferred to off-site location.	Same as Alt. 5A, except off-site location is impacted.	Same as Alt. 5A. Estimated aeration period-10 weeks.	No public comment obtained.
5C. On-Site Aeration[1,3] and Cap	177	38.9	415	Combination of Alt. 2 and 5A.	Combination of Alt. 2 and 5A.	Combination of Alt. 2 and 5A.	Combination of Alt. 2 and 5A comments.

* Selected Remedial Action

1. Use of clay cap instead of synthetic liner reflected in revised F.S. cost.
2. Revised F.S. cost estimate based on the following assumptions:
   - Use of EPA Portable Incinerator
   - 1 cubic yard capacity/hour
   - 50% down time
   - $23,000/day operational cost
3. Revised F.S. cost estimate due to more conservative estimate as to duration of aeration than was presented in the F.S.

TABLE 7B

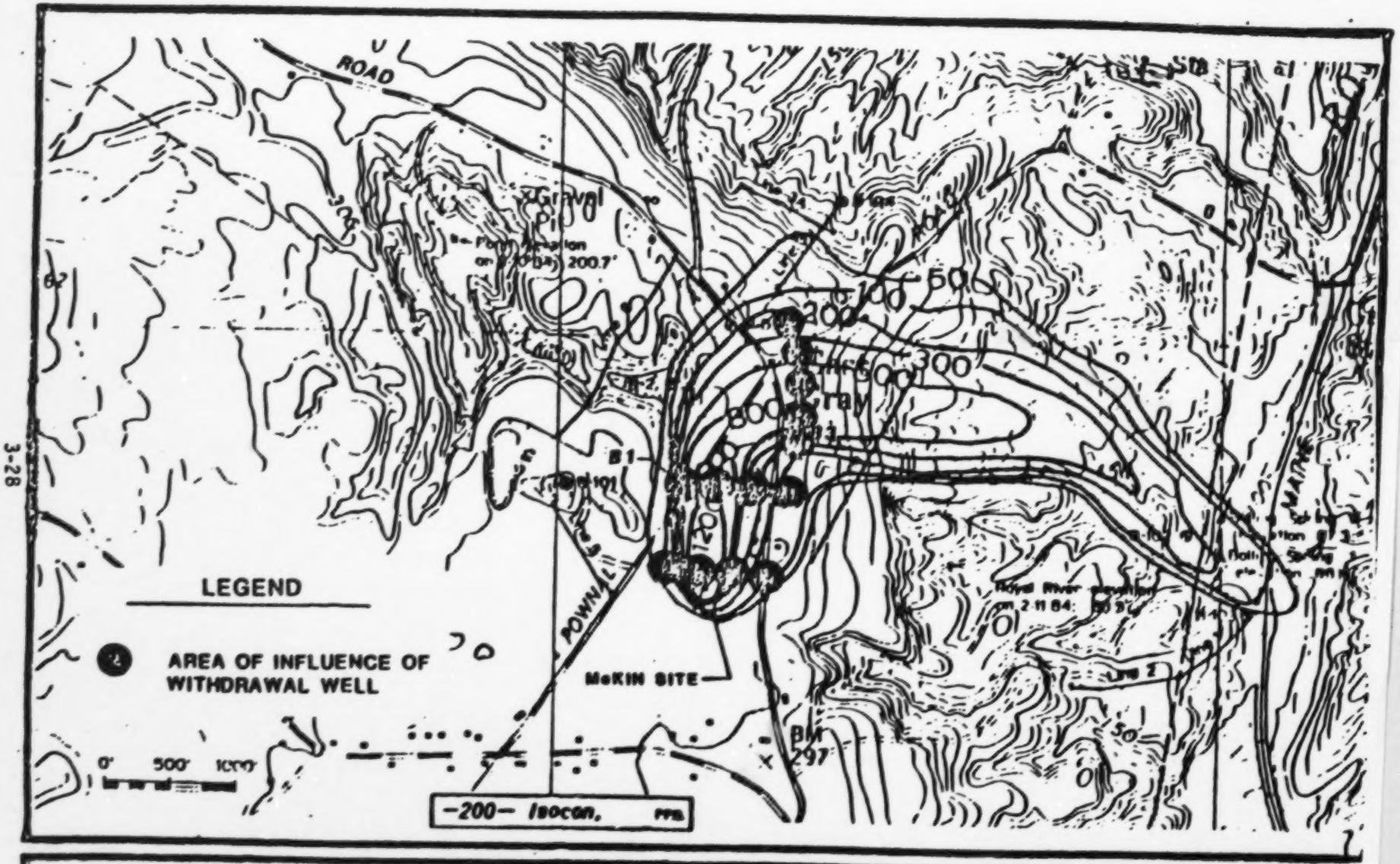
McKIN COMPANY SITE, MAINE

OFF-SITE CONTROL REMEDIAL ALTERNATIVES[1]

Alternative	PROJECT COST ($1,000) Capital	O&M	Present Worth	Public Health Considerations	Environmental Considerations	Technical Considerations	Public and Elected Officials Comments
6. No Action w/Monitoring	3.5	37.3	226	Groundwater still contaminated with decreases due to source control and natural mechanisms only. Alternate water supply reduces potential for exposure. No guarantee of use restriction.	No action to restore aquifer. Time to reduce Total Volatile Organics to 50 ppb estimated at 10 years, assuming source control.	Reliability based on computer modelling of aquifer. Adjustments in response to monitoring may be necessary. Low level technology required. Inconsistent with RCRA. O&M required for groundwater monitoring.	Unacceptable to most.
7. Withdrawal Wells, Treatment and Discharge of Treated Groundwater*[3]	3,495[2]	37.3	3,128	Groundwater contamination reduction accelerated, particularly in surficial aquifer, because of extraction and treatment. Alternate water supply further reduces potential for exposure.	Active restoration to restore aquifer. Time to restore Total Volatile Organics to 50 ppb estimated at 5 years, assuming source control. Treatment standards for groundwater discharge and air emissions from treatment system needed.	Reliability based on accurate location, depth and pumping rate of extracton wells and groundwater discharge and, in part, on uncertain subsurface conditions. Access to installation and monitoring of wells on private property is needed. No operation and maintenance, other than monitoring costs, if performance standards are met.	Most are in favor of this action with reservations regarding state costs.
8. Restrictions on Future Development	115	37.3	266	Same as Alt. 6 except use restrictions eliminate exposures.	No action to restore aquifer. Time to reduce Total Volatile Organics to 50 ppb estimated at 10 years, assuming source control.	Reliability based on uncertain ability to implement and enforce restrictions. Aerial extent of restrictions needs to be defined in legal restrictions.	No public comment obtained.

* Selected Remedial Action

1. Each off-site control assumes the implementation of a source control location other than Alternate 1.
2. Assumes 5-year remedial treatment unit achieving performance standards, see text of Remedial Alternative Selection.
3. Revised F.S. costs reflect revised, selected groundwater extraction and treatment option based on:
   - 25 wells @ 5 gpm/well
   - discharge of treated groundwater to surface water.



McKIN SITE, GRAY MAINE

GROUNDWATER WITHDRAWAL WELL LOCATIONS SUPERIMPOSED ON INFERRED 1,1,1-TRICHLOROETHANE SURFICIAL AQUIFER PLUME

CAMP DRESSER & McKEE INC.
One Center Plaza
Boston, Massachusetts 02

FIGURE 12